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THE IRON AGE

A Review of the Hardware, Iron, Machinery and Metal Trades.

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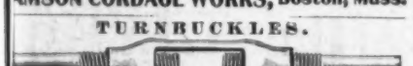
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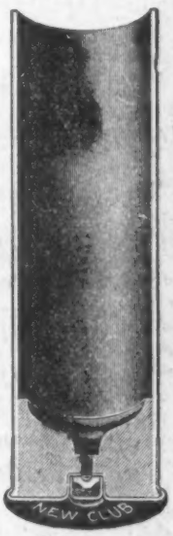

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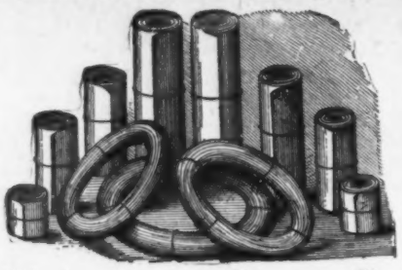

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THE IRON AGE

THURSDAY, JANUARY 3, 1901.

Direct Connected Steam Engines and Generators.—I.

BY FRANK C. PERKINS, BUFFALO, N. Y.

Direct connected generators are the order of the day. Not only have they found favor for isolated plants using direct current apparatus, but also for street railway work have discarded entire central station equipments and remodeled their plants, replacing all belted machines by direct connected apparatus of larger units than before.

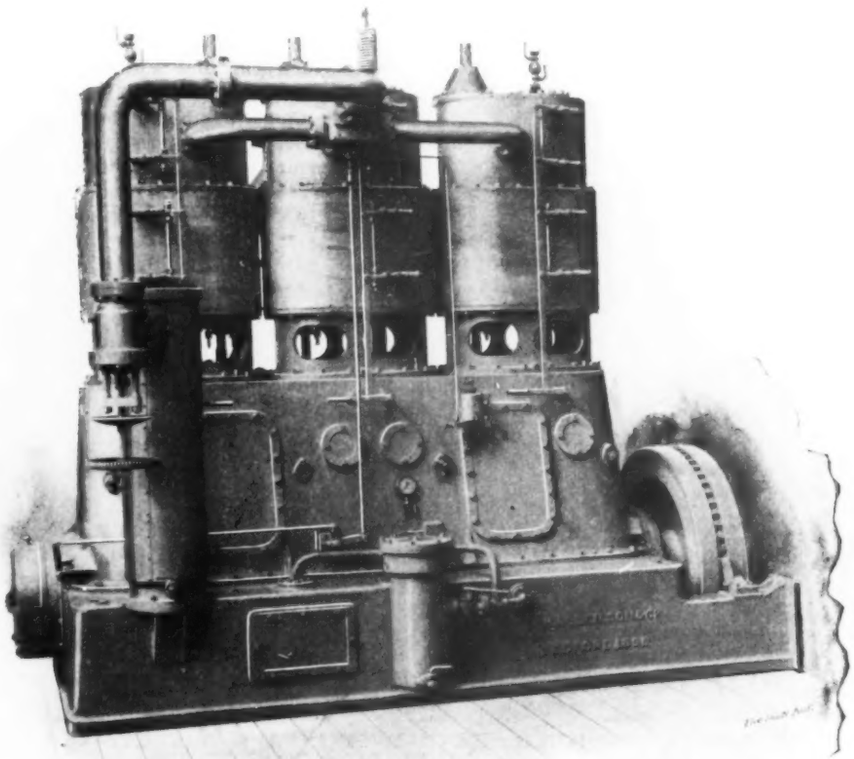

Fig. 1.—British Three-Cylinder Vertical Engine.

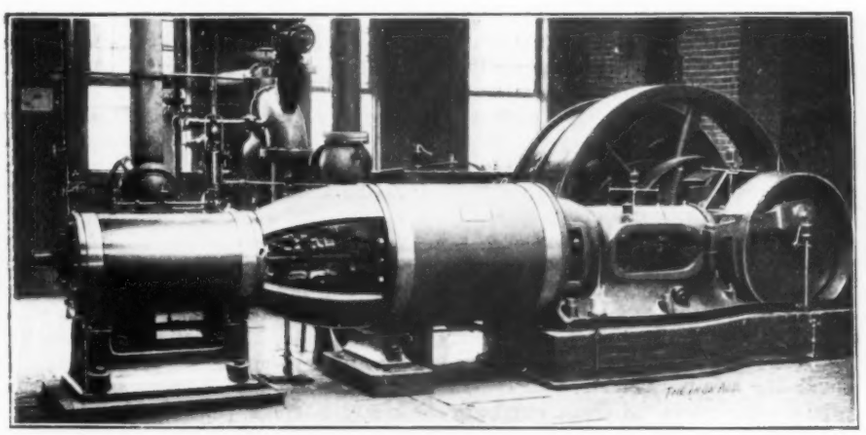

Fig 2.—American Tandem Compound Engine.

DIRECT CONNECTED STEAM ENGINES AND GENERATORS.

and in single phase and polyphase installations of various sizes. The German and English stations were the first to be generally equipped with direct connected apparatus, but recently many of the existing American plants

It may be of interest to compare the foreign with American practice in small direct connected units for isolated plants and moderate sized stations using direct current apparatus; then taking up American and English direct

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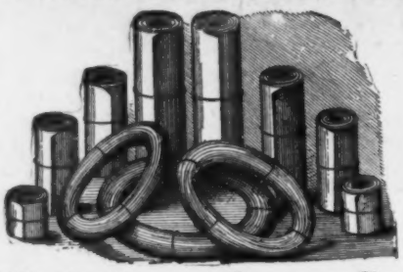

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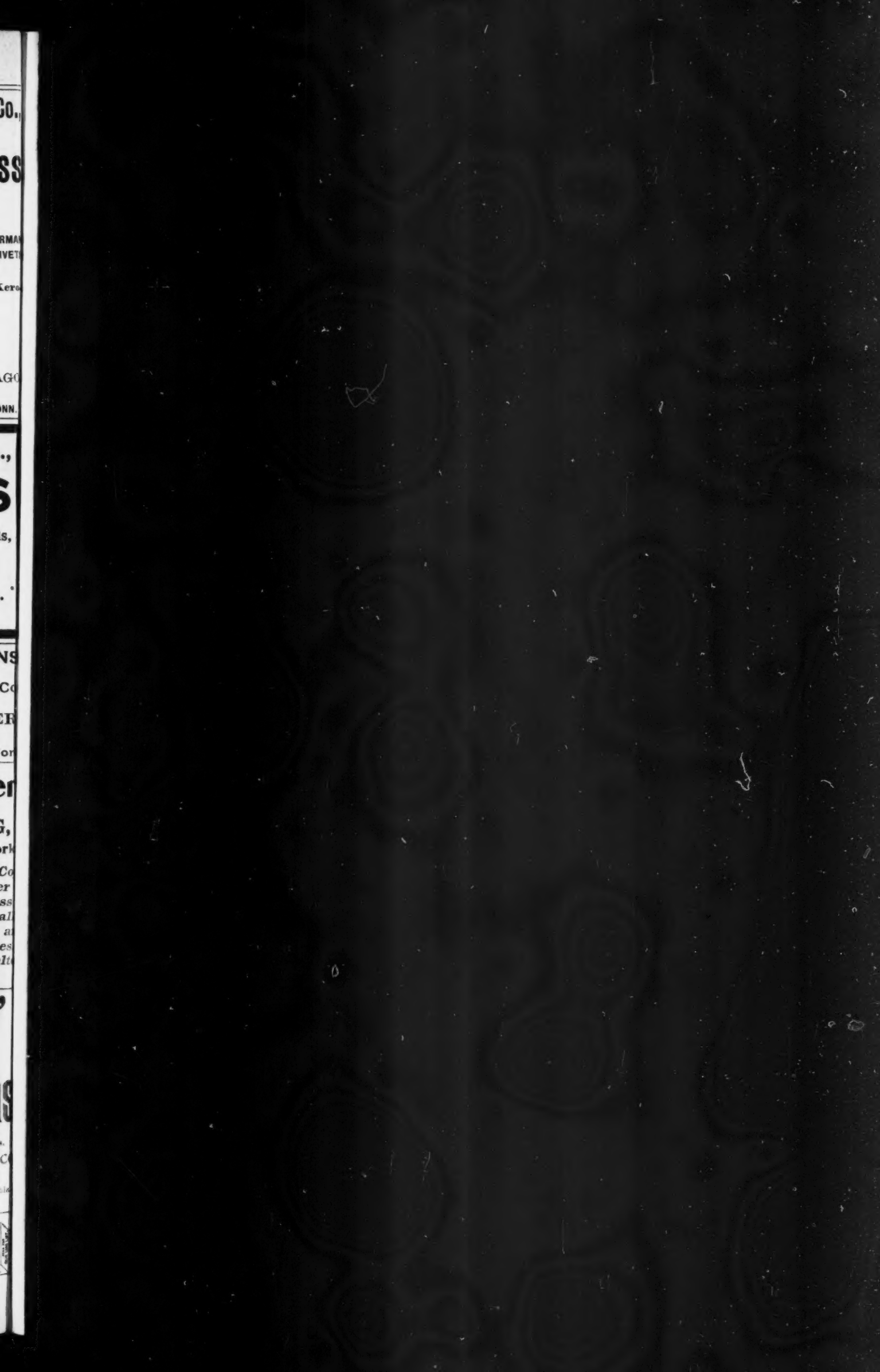

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Direct Connected Steam Engines and Generators.—I.

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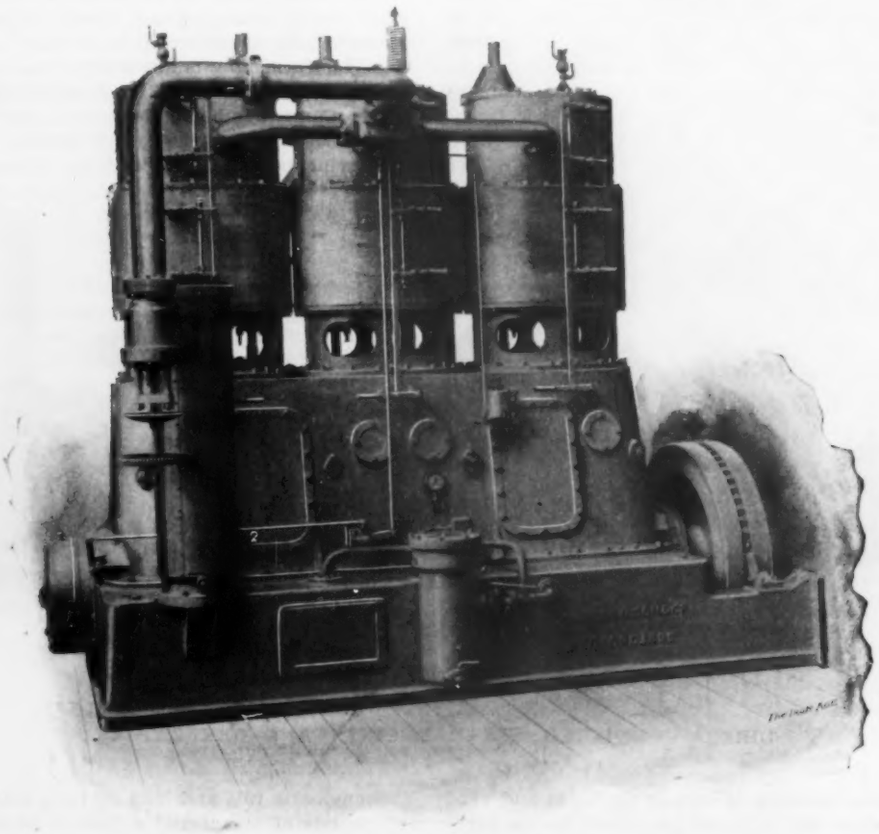


Fig. 1.—British Three-Cylinder Vertical Engine.

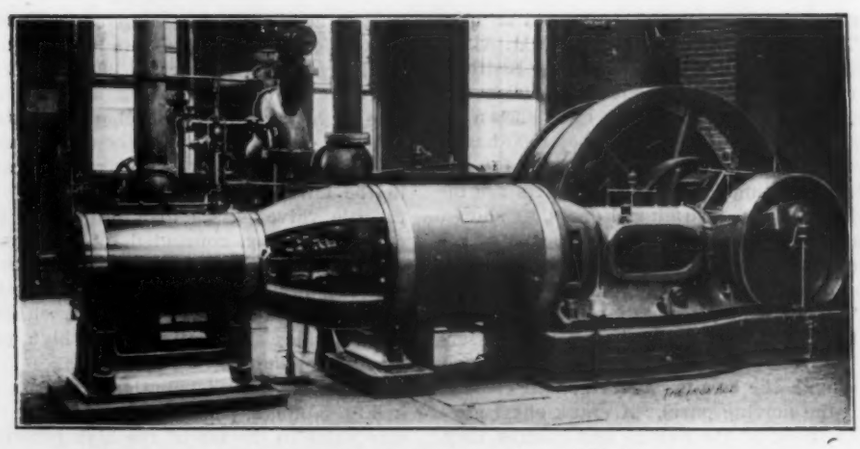


Fig 2.—American Tandem Compound Engine.

DIRECT CONNECTED STEAM ENGINES AND GENERATORS.

and in single phase and polyphase installations of various sizes. The German and English stations were the first to be generally equipped with direct connected apparatus, but recently many of the existing American plants

It may be of interest to compare the foreign with American practice in small direct connected units for isolated plants and moderate sized stations using direct current apparatus; then taking up American and English direct

connected railway apparatus of both horizontal and vertical types, and finally comparing the general construction of the larger engines and generators in modern alternating current practice.

There is no question but that the direct connected engine of either horizontal or vertical type economizes space wonderfully over the belted equipment. For isolated plants in large office buildings in business districts of large cities the modern practice is always to favor this equipment. The horizontal high speed engine direct connected to moderate sized units has seemed to be more in favor in the United States up to the present time, while the English practice has been to use the vertical engine almost exclusively for small direct current units, and even in larger installations the vertical types have been most frequently selected. There is little doubt that, between these types, the vertical direct connected engine and dynamo is more economical in space than the horizontal direct connected engine and generator. It is claimed that with large units in both types the vertical engine will occupy but 0.5 square foot per horse-power, while the horizontal engine will take from 1 to 2 square feet per horse-power of plant. The smaller direct connected plants almost invariably employ automatic high speed engines, the English practice being to use most frequently bipolar continuous current dynamos and vertical engines, while the American practice is to use horizontal engines and multipolar dynamos.

British Vertical Engines.

A British vertical direct connected equipment is to be seen in Fig. 1. These engines were built by W. H. Allen, Son & Co. at the Queen's Engineering Works at Bedford, England. The two-crank engines range up to 400 horse-power capacity, while the three-crank type shown in Fig. 1 have been installed up to a capacity of 1500 horse-power. The two-crank engines have cranks at 180 degrees and are double acting. The working parts are inclosed in a trunk fitted with two hinged doors, as shown on the photograph, and are lubricated by means of oil under a pressure of about 20 pounds per square inch, the force pump being driven from one of the eccentrics. The oil is forced from a strainer through pipes to all the working parts, from whence it drops into a large reservoir formed by the base plate of the engine, and is once more pumped through the strainer before again coming into contact with the moving parts. A crank shaft governor controls the speed of the engine and insures very close regulation. The valves are placed outside the cylinders, which are thus brought as close as possible together so as to insure very steady running.

The larger engines of the three-crank type have tandem cylinders, the high pressure cylinder being arranged above the low pressure, only one valve being required to distribute the steam to both cylinders. Owing to this disposition the turning moment is very uniform at all loads, and the engines run with great steadiness.

American Horizontal Engines.

The accompanying illustrations of American horizontal engines and direct connected generators are of interest to the reader as showing types that are in general use for isolated work and moderate sized station work, as compared to the foreign vertical type. These moderate sized engines are usually connected to direct current generators of multipolar type. Considering some of the American built engines as typified by the direct connected 275 horse-power engine in the Lake Shore Foundry Company's plant at Cleveland, the 250 horse-power tandem compound engine at the works of the Otis Steel Company, and the group of direct connected units at the Fort Wayne shops of the Pennsylvania Railroad Company, Fig. 2, while all are of different make, compare most favorably with the foreign types for the same class of work. Some of the latest types of American engines are so arranged that, besides supplying power to generators direct connected to the shaft, pulleys are provided for furnishing additional power.

At the power plant of the Harrisburg Light, Heat & Power Company the tandem compound Corliss engine, Fig. 3, not only operates two multipolar generators, but arrangements are provided for a rope drive as well.

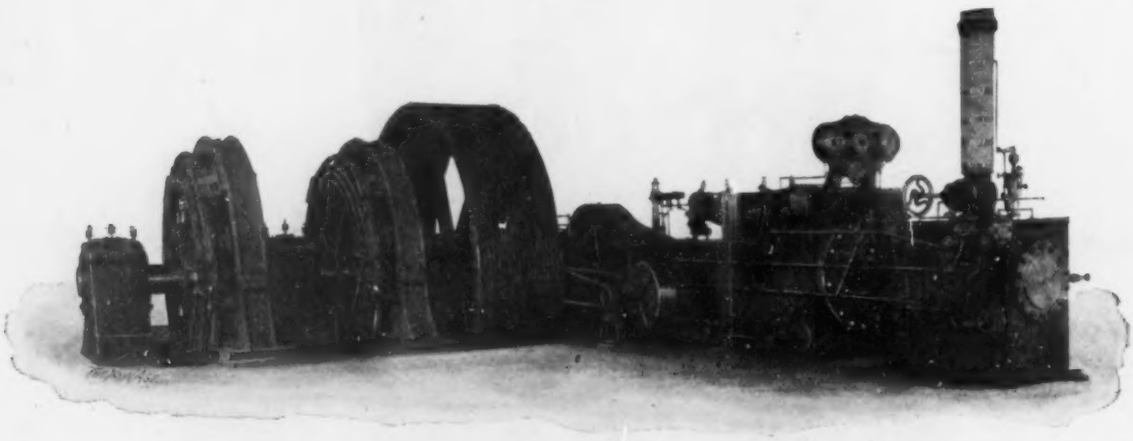


Fig 3.—Tandem Compound Corliss Engine.

DIRECT CONNECTED STEAM ENGINES AND GENERATORS.

This engine is 19½ and 38 x 30 inch, and operates with 125 pounds of steam and a 26-inch vacuum, the speed of the engine being 120 revolutions per minute.

Built by Davey, Paxman & Co.

The English high speed engine illustrated in Figs. 4 and 5 is single acting—that is, the balance of pressure is always toward the crank shaft, and it is said, therefore, to have no back lash in any of the bearings. The high pressure steam chest consists of the annular space round the main body of the valves, and is situated partly in the high pressure cylinder casting and partly in the low pressure cylinder casting. Steam from the throttle valve passes to a branch on the low pressure cylinder casting, connected by passages in that casting to the three high pressure steam chests. This construction has been adopted in order to permit of any high pressure cylinder being removed without breaking any joint besides that between the high pressure and low pressure cylinders.

Following the distribution of steam to the cylinders in Fig. 5, steam passes under the edge of the high pressure valve to the top of the high pressure piston, and is exhausted over the top of the high pressure valve, down through the center of the main body of the valve and thence over the top of the low pressure valve to the under side of the low pressure piston, and finally is exhausted under the lower edge of the low pressure valve to the exhaust chamber.

In the bore of the high pressure cylinder are cut two small by-pass ports, over which the high pressure piston passes at the top of its stroke, thus placing the space

between the high pressure and low pressure pistons in direct connection with the upper side of the high pressure piston. This space, which is called the controlling cylinder, is thus at the top of the stroke filled with steam at approximately the same pressure as that in the high pressure cylinder; on the down stroke this steam expands, and on the up stroke it is compressed until at the top of the stroke it again reaches the pressure of the steam in the high pressure cylinder, any small loss that may occur by leakage being made good by fresh steam passing from the high pressure cylinder.

The function of this controlling cylinder is to effect a balance of the upward inertia force of the pistons, cross head, connecting rod, &c., on the up stroke—that is, to keep a slight excess of pressure in a downward direction throughout the up stroke. Thus on the up stroke the steam acts on the under side of the low pressure piston, but instead of being allowed to act directly on the crank, it does work in compressing steam in the controlling cylinder and in displacing the steam under receiver pressure from the high pressure cylinder. The work thus done in compressing steam in the controlling cylinder is given out again by its expansion on the next stroke down, and the work done in transferring steam under pressure from the high pressure cylinder to the receiver is utilized in the low pressure cylinder.

It will be noticed that the valves are always subject to a receiver pressure, which tends to maintain them in constant downward thrust; this, however, is not quite sufficient to overcome the inertia of the valve and its motion at the top of the stroke, and to supply this deficiency an air buffer cylinder is employed; this is fixed in the working chamber. The crank shaft is placed out of line with the cylinders. The reason for adopting this position is that it gives a nearly straight connecting rod during the downward working stroke, when the pressures are greatest, and keeps what pressure is due to the angle of the connecting rod on the back cross head slide. On the up stroke, when the angle of the connecting rod is greatest, the downward pressures are only sufficient to balance in inertia forces of the reciprocating parts, and therefore, although the angle of the connecting rod is considerable, the pressure transmitted to the cross head slide is small, and what there is is still on the back slide. That is, the cross head is kept always pressed against the back slide. If the crank shaft were placed as is usual, in line with the axis of the cylinders, the cross head would be alternately pressed against the front and back slides on the down and up strokes respectively, and any wear would produce a knock in those parts.

The valves are worked from a point on the connecting rod by means of a rod and rocking lever. These as well as the main parts are kept in constant thrust. This valve motion brings the valves into a convenient position—viz., at the back of the steam cylinders, so that the cylinder centers can be brought close together; at the same time, there being no eccentrics on the crank shaft, ample room is left for long and well supported bearings. The working parts run in a bath of oil and water, all parts being constantly splashed over with lubricant; a

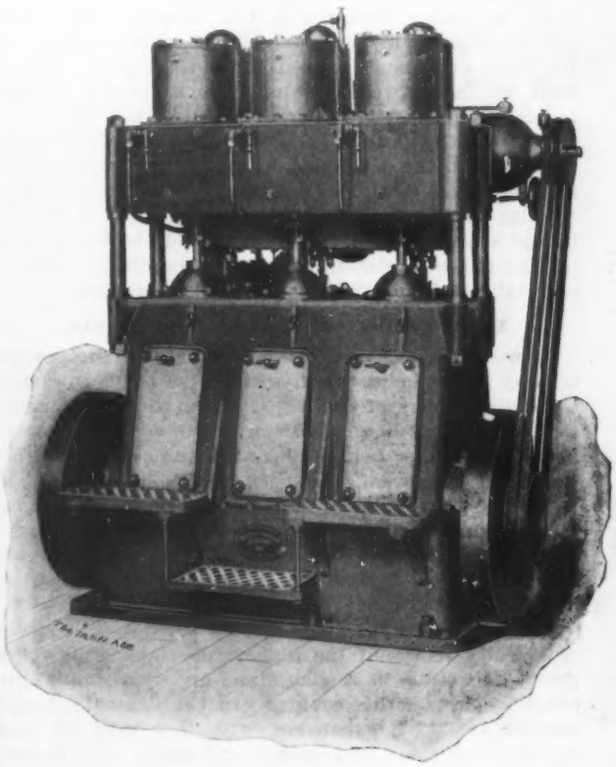


Fig 4.—British High Speed Vertical Engine.

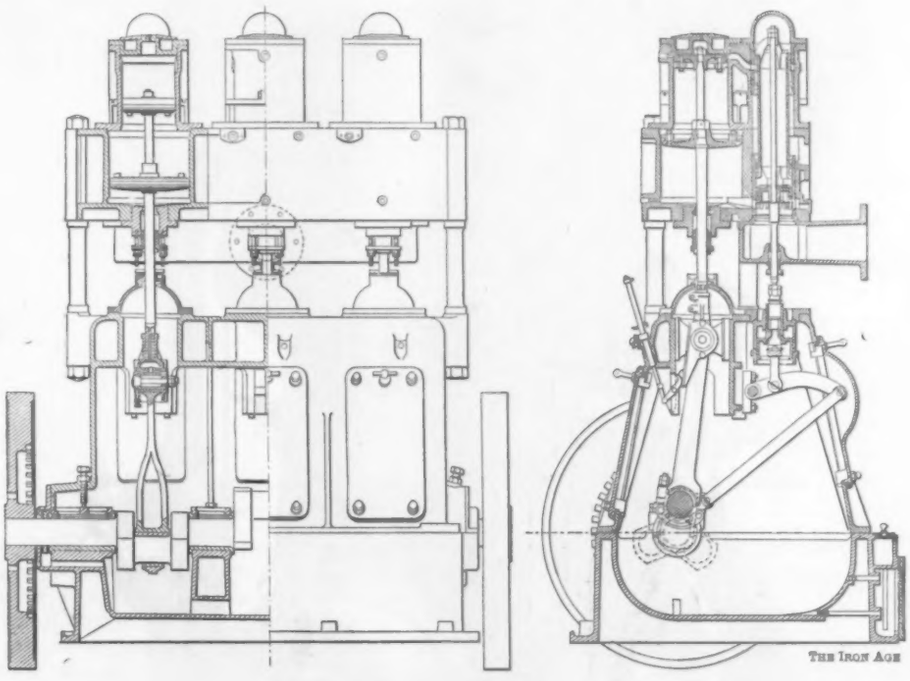


Fig. 5.—Sectional Elevations of Fig 4.

DIRECT CONNECTED STEAM ENGINES AND GENERATORS.

gauge tank at the back shows the hight of the lubricant bath. The steam cylinders are supported on four wrought iron columns, and are entirely isolated from the working chamber.

These engines are manufactured at Colchester, England, by Davey, Paxman & Co., Limited. For small vertical engines iron columns may be well adapted, but for large engines demanded for power house work a built up frame work is absolutely necessary. Many builders simply follow marine practice, but the conditions are not the same. In marine work the engines may be braced to the decks and to each other, while this is not possible in street railway power house practice. The framing should be particularly arranged to stand the lateral stresses caused by the action of the crank, connecting rod and rotating masses. The ordinary framing is usually well adapted for the vertical stresses.

Direct Connected Street Railway Plants.

Considering the use of direct connected engines for railway power house work, we find the foreign practice to consist largely of vertical engines, while the American practice has been until recently to equip the power house with either belted apparatus or horizontal direct connected engines. The most recent installations of large size have adapted the vertical compound engine direct connected to railway generator, particularly in large cities, where space is valuable and the largest amount of power must be generated in the smallest possible space.

Large vertical direct connected railway generators now really represent the highest development in Germany, as well as in England, and are fast coming into extensive use in this country. In Germany the larger engines are triple expansion, with four cylinders and double crank shaft, and operate at from 80 to 90 revolutions per minute. These engines have a high pressure and one low pressure cylinder on one crank and an intermediate and a second low pressure cylinder acting on the other crank shaft, highly superheated steam being

Fig 7.—German Engine

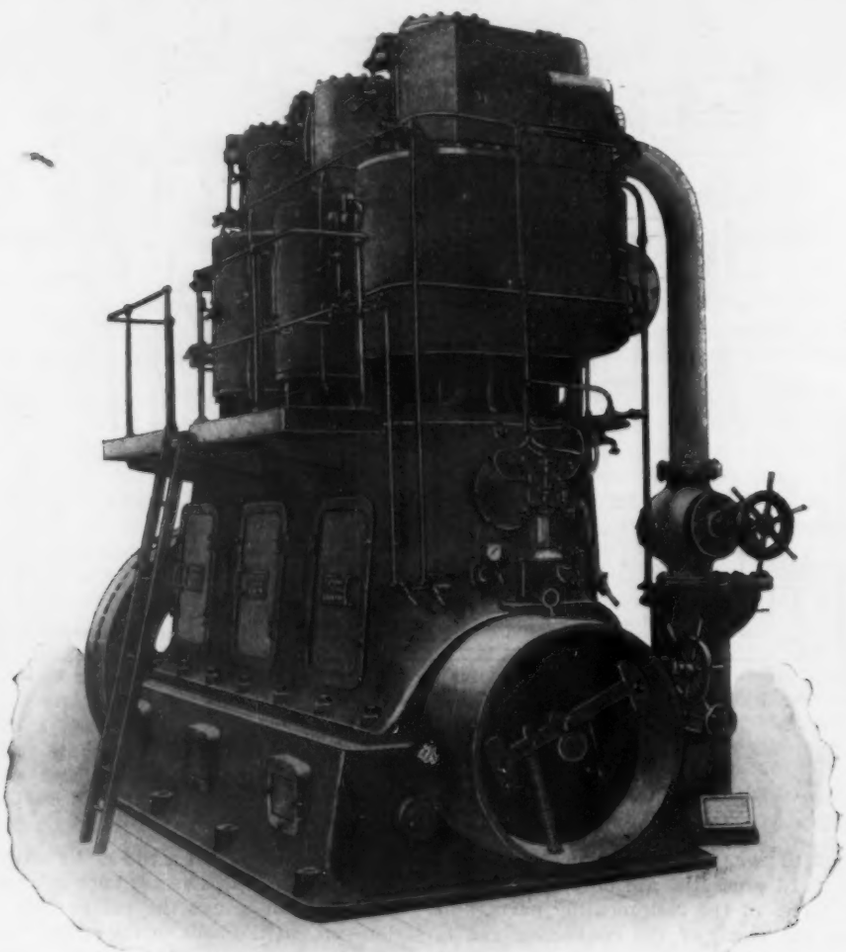


Fig. 6.—British High Speed Engine

DIRECT CONNECTED STEAM ENGINES AND GENERATORS.

frequently used at a temperature of more than 300 degrees C.

The smaller engines are two-cylinder compound engines and have a speed of from 100 to 110 revolutions per minute. Gebruder Sulzer of Winterthur have brought the poppet valve to a high degree of perfection, competing, as it does, with the Corliss valve in Germany, Switzerland and throughout the Continent. The double seated valve is replaced by four-seated valves to accomodate the higher steam pressures and increased speed. Two double seated tubular valves are placed one above the other. It is frequently claimed that the Sulzer poppet valve, used so largely in foreign practice, has greater durability than the Corliss valve, and is better adapted to the use of superheated steam. It is also considered by some engineers to be better than the piston or slide valve on account of the small amount of friction and the small amount of high grade lubricating oil required. In American and English steam engine practice the Corliss system is considered the best and is most largely used in large power plants. For railway power work the fly wheel must be depended upon almost entirely to aid in regulation, as the enormous electric currents employed have no inertia and are either all off or all on very frequently when cars are at a standstill or many are being started at once. Electric railway work is very much more severe on the engine than is the cable system, for with the latter there is the whole length of the cable under motion, and this helps to steady the engine when the load is thrown on or off. The two classes or types of valve gears mostly used are the drop cut off or releasing valve gear and the positive cut off. In the former the governor simply indicates the point at which cut off is to be made, while in the latter class the governor helps the cut off mechanism in its operation. The Corliss valve gear is very satisfactory in railway power houses, where the largest engines are in use.

The Liverpool Overhead Railway Company have installed high speed engines of the type shown in Fig. 6. This engine develops 1500 horse-power and is of the three-crank tandem compound type. It was built at Manchester, England, by Browett, Lindley & Co., Limited, and gives a very fair idea of the foreign type of railway generator and direct connected engines.

Some of the finest examples of large engines manufactured on the Continent of Europe are those turned out by the firms of Esscher, Wyss & Cie. of Zurich, Switzerland, and Franco Tosi of Legano, Italy. The illustration, Fig. 8, shows a 300 horse-power triple expansion engine of the former firm, and Figs. 4, 9, 10 and 11 drawings of engines built by Tosi.

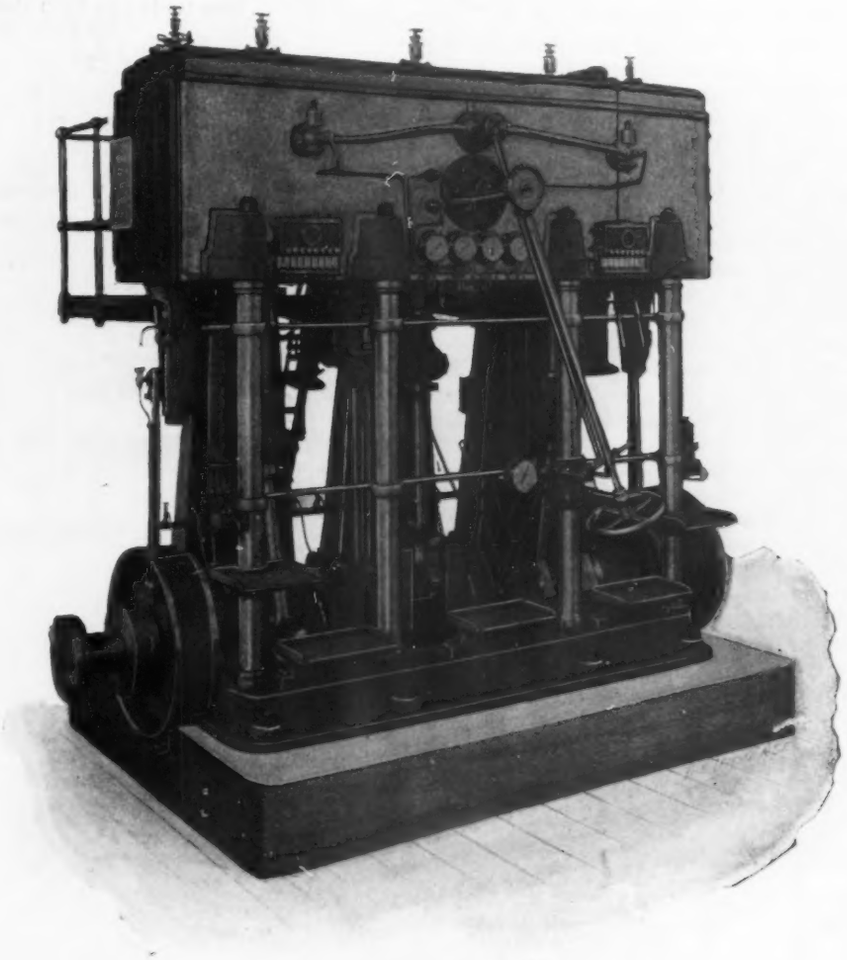


Fig 8.—Swiss Engine.

DIRECT CONNECTED STEAM ENGINES AND GENERATORS.

Italian Engine.

The large 1200 horse-power Tosi horizontal triple expansion engine shown in Fig. 11 was built for operating large alternators at very high economy. The speed of the engine is 107 revolutions per minute and the piston stroke is 1200 mm. This engine delivers 1200 horse-power at a pressure of 12 atmospheres and can be operated at a full maximum capacity of 1500 horse-power. The high pressure cylinder is 595 mm. in diameter, the intermediate 825 mm. and the low pressure cylinder measures 975 mm. in diameter.

The Tosi 1200 horse-power engine, Fig. 11, is a four-cylinder triple expansion. The high pressure and intermediate cylinders are coupled with cranks at right angles. Back of each is a low pressure cylinder, as shown in the drawing, the arrangement being the reverse of that usually followed here. Instead of putting the cranks on the end of the shaft and the fly wheel or

generator in the center, the cylinders are brought together upon two center cranks and the generators are coupled to the ends of the shaft. All cylinders with the exception of the high pressure, which is designed to work with superheated steam, are jacketed on barrel and head, and the steam has to pass through the jacket to reach the steam valve. Each cylinder has four valves for the distribution of steam.

German Engine.

The Siemens & Halske Electric Company of America have recently installed a railway generator in St. Louis, Mo., which will be seen in Fig. 7, and illustrates one of the vertical direct connected engines of American manufacture. This generator supplies 500 volts direct current and has a capacity of 500 kw. It is of the 12-pole type and weighs about 50 tons, the direct connected armature operating at a speed of 90 to 95 revolutions per minute.

American Engines.

The Metropolitan Traction Company of New York City have just installed 11 cross compound vertical condensing engines of 5000 indicated horse-power each and capable of carrying an overload to nearly 7000 horse-power. To each of these engines is direct connected a three-phase alternating generator having a revolving field and stationary armature. A three-phase current of 6000 volts is generated by these machines and is transformed at sub-stations to direct current of 550 volts potential. The crank shafts of these engines have a tensile strength of 80,000 pounds, and the lowest limit of elasticity is 50,000 pounds. Over 14,000 tons pressure was used in the hydraulic forging of these shafts, the pump pressure being 6000 pounds per square inch. Nickelized steel is used, fluid compressed and forged on a mandrel by hydraulic pressure. Finally, after careful annealing, they were tempered in oil. This plant represents the latest and highest development in vertican direct connected engines in American railway steam engine practice.

In the power house of the Cleveland Street Railway a large direct connected vertical engine, Fig. 12, of American manufacture operates a 2400-kw. General Electric railway generator. The speed of this engine is 75 revolutions per minute, and the generator has an output of 4000 amperes at a potential of 550 volts. The generator weighs more than 85 tons; while the armature and commutator aid as a fly wheel, weighing about 40 tons. The diameter of the armature is 12 feet, while the total length of the generator is more than 20 feet and the hight about 25 feet.

(To be continued.)

Iron Trade and Other Conditions in Scotland.

GLASGOW, December 6, 1900.—The event of the week in the Scotch iron trade has been the reduction of mak-

Fig. 9.—Italian Engine.

DIRECT CONNECTED STEAM ENGINES AND GENERATORS.

ers' prices for pig iron. Hitherto makers have not taken any notice of the decline in warrants and in manufactured iron, but though they maintained official quotations they have not been above making concessions on the quiet of late weeks. This week, however, William Baird & Co., the leading smelters in the trade, announced the reduction of 2 shillings per ton for their special brands and, of course, other makers follow suit. This reduction will make Gartsherrie No. 3 pigs 68 shillings 6 pence and Eglinton No. 3 67 shillings and No. 1 69 shillings. Makers' prices are thus coming into normal relations with warrants which, while these lines are being written, are at 66 shillings 9 pence for Scotch G. M. B. The warrant market has gone very flat on this movement of the makers. With a declining consumption and reduced export, the holders of warrants have before them the prospect of more warrants being created in the near future by the sending of iron into store.

There is no movement that way as yet in Scotland, but there is in Cleveland, where iron is again going into store as a consequence of the slackened demand, and that notwithstanding the fact that there is now ample margin on which to send Cleveland iron into Scotland.

Indeed, the bottom seems to have come out of the Middlesbro market and naturally this has a very depressing effect on the Scotch market. Production is being reduced in Yorkshire, in Cumberland and in the Midlands by the blowing out of furnaces, and it is likely that there will be some damping down in Scotland before the end of the year. Yet for the first time for months past the public stocks are on the increase. By December 5 the total in all the warrant stores in the United Kingdom was 135,799 tons, as compared with 126,294 tons on November 30, which was the lowest point touched this year. At the beginning of the year the stock was 523,230 tons, but then the demand for both home and export was active.

No improvement in the manufactured iron and steel trades can be reported. On the contrary, the Scotch wrought iron makers have this week again reduced the price of bars by 10 to 15 shillings per ton. They are compelled to do this by Belgian, German and American competition, and yet with all their efforts they cannot obtain orders enough to keep their works going full. Nearly all the iron mills in the Coatbridge district are reported to be now on short time. They are now getting pigs cheaper, but coal not much cheaper. All the reductions in finished material are far more than the reduction in costs.

The trade has been rather startled by the first move of the new rivet, bolt and nut combine, which is to reduce prices all around by about £1 per ton. As one main object of the combine was to put an end to the cutting which has been the curse of the rivet and nut trade for some time past, the object of this move has not been quite understood. It has, however, a double meaning—to encourage trade and to warn off competitors, including those Scotch firms who have not yet entered the combine. Whether or not the reduction is a warning to all and sundry that the combined firms are now strong enough to bear down any competition, it is a welcome relief to shipbuilders and other consumers. All iron and steel is now so much down that a stimulus ought to be given to the trade if there is any left at all.

Shipbuilders ought to be doing very well now, with the actual and prospective reductions in material and fuel. Of course it is customary for them to cover the bulk of the material which they hold under offer before they tender to a specification, when they book an order. But they must always run a certain amount of risk, as they cannot cover everything in advance, and on all uncontracted for material they will now do well. Moreover, some of them would not buy ahead in plates at the high prices current during the summer, and therefore practically sold for the fall in booking new vessels. Those builders have done well out of American plates and will now continue to do well out of Scotch and English plates. There is a renewal of cheap offers of American steel this week. The shipyards have a lot of paying work on hand, and more orders are dropping in this month, with many inquiries from abroad. In fact, the indications at the moment are that there is going to be

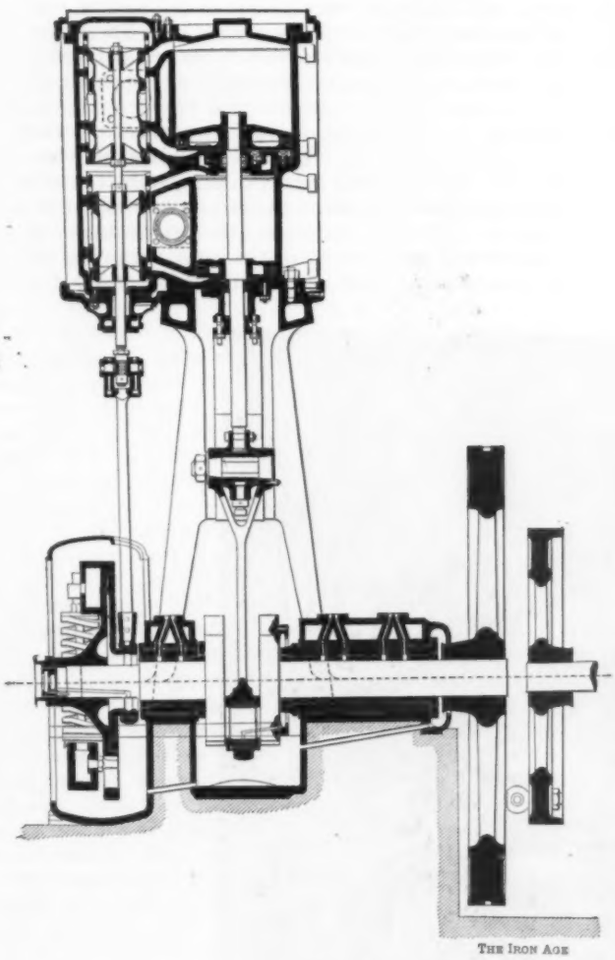


Fig. 10.—*Vertical Section Fig.* 9.

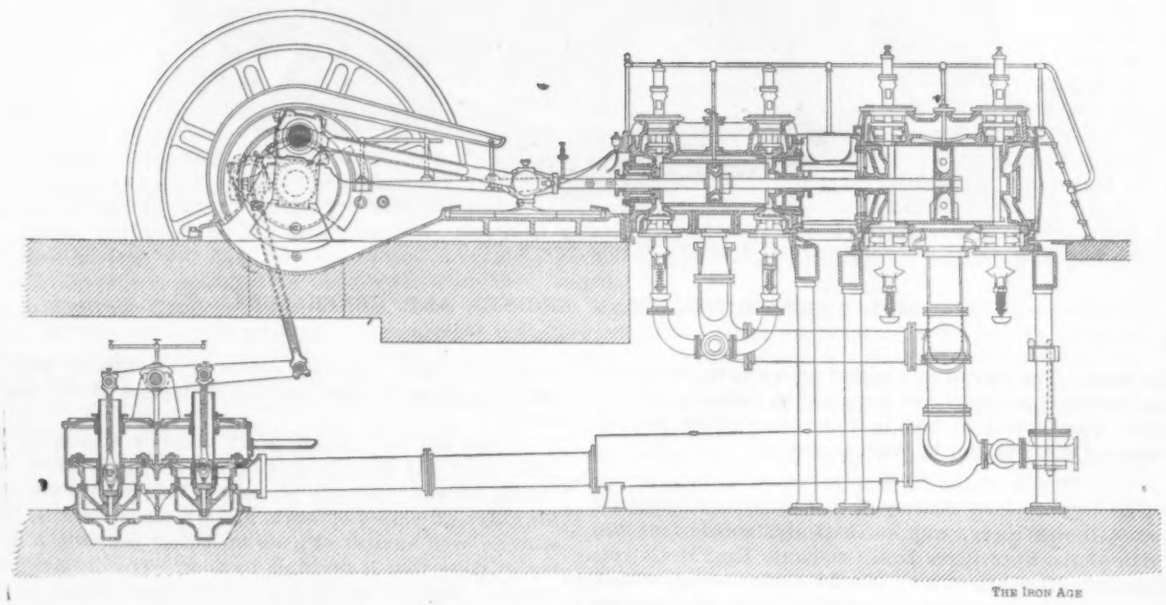


Fig. 11.—*Tosi Horizontal Engine.*

DIRECT CONNECTED STEAM ENGINES AND GENERATORS.

shortly another rush of shipbuilding orders such as we had last year, and again in a smaller degree in the July to September quarter.

It is reported that Harland & Wolff of Belfast are about to convert their business into a joint stock limited liability company, but that none of the ordinary shares and only a portion of the preferred shares will be offered to the public. The announcement is not unexpected, for this concern have now grown to gigantic dimensions, and most of the big concerns in the trade in Scotland and on the North of England are now under the Limited Liability act. It is, perhaps, hardly necessary to say that Harland & Wolff are the established purveyors of the White Star Line.

Curiously enough, while the coal markets of Newcastle and South Wales are rattling down and very shaky, the Scotch market has become rather steadier this week. That is not to say that prices have recovered, but merely that sellers are not quite so pressing as they were. This condition has been brought about not by increased demand, but by reduced supply. B. T.

The torpedo boat destroyer, "Macdonough," for the United States Navy, was successfully launched at the works of the Fore River Iron Company, East Braintree, Mass., on Monday. The "Macdonough" is of a new type, and is to be one of a fleet of 50 craft of the same kind. Her dimensions are: Length, 242 feet; breadth, 22 feet, and depth, 14 feet The armament will consist of four 14-pound 3-inch rapid fire guns and three 6-pounders. Two 18-inch torpedo tubes are located in the stern. Her speed will be 30 knots per hour.

The Federal Court, in a jury trial at Des Moines, Iowa, has ruled that debts on "option deals" on the Chicago Board of Trade are gambling debts, and therefore non-collectible.

Some Requisites of Modern Lighting Generator Sets.*

BY H. G. REIST, OF THE GENERAL ELECTRIC COMPANY.

At the Washington meeting of the American Society of Mechanical Engineers, May, 1899, an interesting and stirring paper was read by Mr. Stanwood on "Standards for Direct Connected Generator Sets." So far as I know this was the first time that the desirability of engine and dynamo builders getting together and trying to make their designs interchangeable as far as practicable was brought before the public. Its importance was at once realized and action taken toward improving matters by the appointment of a committee and by inviting other organizations interested to co-operate. I understand these committees are taking up the standardization of speeds of engines as well as the proportion of certain parts that affect the two pieces of machinery, such as the dimensions of base and the diameters of the engine shafts.

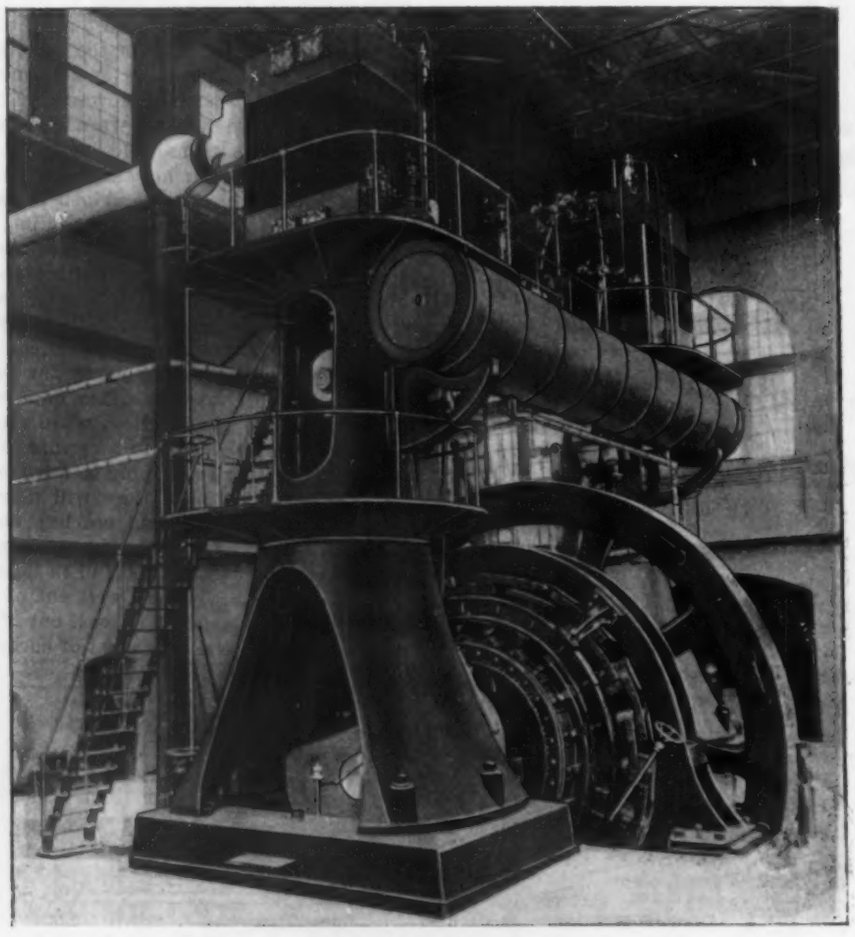


Fig. 12.—Street Railway Engine and Generator.

DIRECT CONNECTED STEAM ENGINES AND GENERATORS.

It will not be possible to fix absolute speeds for engines used for directly driving alternating current machines, because currents of various frequencies are used for different classes of work, and dynamos must be built with an even number of poles or, better yet, with a number of poles that is divisible by four. The ordinary frequencies used are 25, 40 and 60 cycles per second in this country, but in Europe the usual frequency is 50 cycles. To illustrate the variation in speed necessary for the various frequencies: For 60 and 40 cycles, a speed of 200 revolutions per minute may be used, but for 25 cycles the speed should be 187 or 214. Similarly we can make 60 and 40 cycle dynamos to operate at 100 revolutions per minute, but the 25-cycle machine must be driven at 94 or at 107. In working over a list of speeds for the various frequencies it will be found that a mean speed

* Abstract of paper read at the New York meeting of the Engine Builders' Association of the United States.

may be selected which in no case need be much departed from; so that it seems perfectly practicable to select a range of speeds for the various sizes of engines at which they may be run without any changes except an adjustment of the governor. Then by a careful selection of sizes best ranged in geometric progression it will be feasible to keep down the number of machines very greatly, leading to duplication, thus to the practicability of making special tools for more of the parts and also to carrying parts in stock and helping toward quick deliveries.

We have given considerable thought to the selection of a range of sizes and have come to the conclusion that if the units were so spaced that each one has a 50 per cent. increase over the one below it there will be a sufficiently large number of machines to meet all ordinary conditions. This conclusion was also sustained by having had practical application in lines of generators and motors spaced about in this way, so that it rarely becomes necessary to go to the expense of developing anything between. This method of determining sizes necessarily gives some of the machines on the list odd ratings, but this will occur in any case many times with either the engine or the generator, since one is rated in horsepower and the other in kilowatts.

The variation in speed allows the same engine to drive generators for the three frequencies standard in this country. With very few exceptions the total variation in speed is less than 10 per cent., in most cases being not more than 2½ per cent. from the mean speed. For each capacity, except the smaller ones, several speeds are proposed to accommodate the different types of engine.

In all reciprocating engines there is an intermittent speed, the speed gradually increasing during the stroke until such time as the power applied is less than the mean power absorbed, after which the speed gradually decreases until steam is again admitted. It will thus be seen that in every single crank engine there is during each stroke or each half revolution a period of increasing speed and one of decreasing. With two cranks at 90 degrees there will be four such periods during each half turn. With cranks set 120 degrees apart there will, of course, be six such periods. The amount of fluctuation in speed is dependent on the number of cranks, the weight of the reciprocating parts, the length of the connecting rod, the proportion and adjustment of the valves and the weight of the fly wheels. It is desirable to keep this variation within certain limits on account of the parallel operation of the generators, but more particularly to insure the satisfactory operation of synchronous apparatus, such as synchronous motors and rotary converters from such circuits.

When two generators are running in multiple their mean speed will be the same, but as the speed is variable, as already explained, there is an instant during which one generator runs a little faster than the other. It will be seen that its potential wave will then get ahead of the wave produced by the other machine, and in consequence current will flow into the second machine and tend to drive it as a motor. A little later, when the engines are further along in the revolution, these conditions will be reversed. This produces cross currents between the machines, which should be avoided. It might be prevented with duplicate sets, if the engines were synchronized—that is, if they were run with the cranks of the machines in the same relative position. The angle of velocity of one engine is then the same as that of the other at all times. But this is not a practical method of operation. This fluctuation is also liable to make synchronously driven electrical machinery drop out of step. In practice the allowable variation is usually given in displacement in degrees of any point on the rotating mass from what it would have if the motion was perfectly uniform, which gives a value that is independent of the number of cranks of the engine. Steam engines intended for directly connecting dynamos should not have an angular deviation in degrees of more than 2½ or 3 degrees of phase; or, dividing the number of one-half of the number of poles of the generator to be driven will give the allowable angular deviation in terms of degrees of the rotating mass. Thus a 40-cycle machine should be driven by an engine whose motion is so uniform that a point on the rotating mass will not vary more than $\frac{2.5}{20}$, or one-eighth of 1 degree, from the position it would have if the motion were perfectly uniform.

In order to obtain this result it is necessary to so proportion the fly wheel, the weight of which depends upon many things, relative to the proportion of the engine, and cannot be given except in special cases. The proportion of the connecting rod is also a matter of importance in this connection.

Mr. Reist here submitted data covering the fly wheel effect necessary to meet the above degree of regulation and submitted a formula representing a safe figure for well proportioned engines. Mr. Reist's formula covered 25-cycle, 40-cycle and 60-cycle machines and was varied to apply to horizontal engines as well as vertical, to single cylinder engines as well as compounds. . . . It would naturally be expected that a three-crank engine with cranks placed 120 degrees apart would require a lighter fly wheel than one with two 90-degree cranks, but in working out the forces of compound three-cylinder engines it is found that other conditions so far enter into the problem that no appreciably better result is obtained than from a two-crank cross compound engine.

Ever since alternating current machines have been built parallel operation has been discussed and tried, at first with great caution, but it is at present the usual method of operation of installations, and experience has taught us that any two alternators of the same frequency and potentials will operate in multiple satisfactorily if they are allowed to do so by the prime motors. No trouble is experienced in operating machines in multiple when driven by water wheels. There are also many installations of steam driven alternators, ofttimes of different types, both belted and direct connected, operating satisfactorily in multiple. The principal trouble experienced in the parallel operation of alternators is due to the variation of the speeds of the machines with reference to each other, producing oscillations in the relative motions of the two alternators. This produces cross currents in the variations of the cut offs of the engines.

In some cases the amplitude of these oscillations is limited in extent, while in others the force is liable to accelerate with more or less rapidity until the machines drop out of step. In som cases the machines may run in parallel for a considerable period, then by some change of conditions oscillations will begin, throwing the machines out of step in a few seconds. The power to produce these oscillations comes naturally from the steam and is caused by the intermittent action of the engine governors, which in their efforts to adjust themselves to compensate for the speed variation cause a periodic delivery of steam. This delivery of steam by jerks keeps up the oscillation in the same manner as the pendulum of a clock. . . . The frequency of this variation is affected by many conditions aside from the fly wheel effect of the rotating mass on the engines, the period of the engine impulses, the synchronizing power of the dynamo, and probably the fly wheel effect of any synchronous machinery driven by the current from the dynamo.

The degree of retardation of the governor required by proper parallel operation must depend upon the combination of these effects and is consequently difficult to predetermine. Mr. Reist submitted one or two illustrations covering this point and the manner in which the difficulty had been satisfactorily overcome.

There are, however, cases where a simple retarding device is not sufficient without seriously affecting the governing of the engine. A special device was suggested to cover a case of this kind. Engines that are directly coupled to alternators that are to be run in parallel should be provided with means by which the speed may be adjusted within a small range without throttling while the engine is running. Such a device is very useful in bringing the machines together without throwing them into parallel when one machine is loaded and the other is idle, otherwise it is necessary to throttle the steam for the engine without load to bring it to the speed of the loaded machine. This device is also very useful to divide the load between the machines, since, however carefully adjusted, high temperatures or some other local condition may throw them slightly out of adjustment.

The Pollak-Virág Fast Telegraph System.

BY HERR PINTER, DIRECTOR OF THE UNITED ELECTRICAL COMPANY OF BUDAPEST.

From *Engineering* of London we take the following translation of a paper read before the Congress of Electricians at Paris, in August last:

A year ago, at a conference held at the Hotel of the Society of Engineers and Architects at Budapest, I had the honor of introducing the Pollak-Virág system of fast telegraphy. Will you permit me to-day to explain to you the details of the trials on a large scale which have taken place since then, and put you *au courant* of the great progress since made by MM. Pollak and Virág with their interesting invention? In order to render my explanations as clear as possible, may I be permitted to refer very briefly to the system which formed the subject of my previous paper?

In the Pollak-Virág fast telegraph system the receiver differs essentially from the receivers employed up to the present, not only in principle, but even in construction. The currents, which are sent out automatically by means of a perforated slip, are directed at the receiving station into a telephone, the membrane of which is provided with a small concave mirror operating in an extremely simple and ingenious manner.

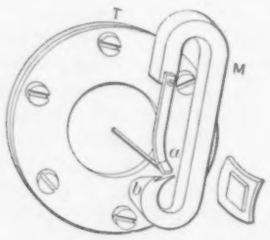


Fig 1.—Connection of Mirror with Membrane.

Fig. 1 shows the connection of the mirror with the membrane. The small mirror is held to a permanent magnet by means of a small plate of soft iron fixed to it. One of the poles of this permanent magnet terminates in two points *b*, while the other pole carries a mobile spring *a*, which is also furnished with a point. Resting upon these three points the small mirror is held magnetically. The movable point is also attached by means of a tiny rod to the membrane of the telephone. The vibrations of the membrane communicate to the small mirror a corresponding movement, the two fixed points forming an axis of rotation. The rays of a small incandescent electric lamp are concentrated by the concave mirror upon a sensitized paper. The incoming currents cause the movement of the telephone membrane and also of the small mirror joined to the membrane; and the light ray is consequently displaced in an upward or downward direction according to these incoming currents. If during this time the sensitized paper is moved in a horizontal direction, we shall find upon the paper, after development, a zigzag line, reproducing exactly the effects of the incoming currents. The alphabet employed is the well-known Morse alphabet, a displacement in an upward direction corresponding to a "dash" and a displacement in a downward direction corresponding to a "dot" of this alphabet, exactly as in the siphon recorder. One of these signals is produced by a positive current and the other by a negative current. The telephone is known to be a very sensitive and fast apparatus, and consequently the signals can be transmitted at an exceedingly high speed, the receiver responding to them with the greatest precision. But in order to secure the desired exactitude it is necessary to annul on the one hand the injurious influence of the line, and on the other hand the disturbance caused by the proper vibration of the membrane. It is known that the result of the capacity, the self induction and the resistance of the line is to retard the currents. By means of a self induction coil of suitable dimensions, joined in parallel with the line at the transmitting station, the disturbances are avoided. Immediately on the cessation of each current a current in the opposite direction is sent into line by the self induction coil. By means of a condenser joined in parallel with the telephone at the receiving station, the self, or proper, vibration of the membrane is also eliminated in very simple manner. By employing a receiver such as has been described, combined with the connected condenser and self induction coil, it is possible to send telegrams over very long lines at a speed exceeding 70,000 words per hour. This has been completely demonstrated by trials made in the presence of competent representatives of the Telegraph Administration and other experts.

In the month of September, 1899, trials were made on an established telephone line, with a length of 1050 km., connecting Budapest and Berlin. With great ease we were able to transmit 70,000 to 80,000 words per hour. The tension of the current was 12 volts and the resistance 3400 ohms. Encouraged by these brilliant results, the inventors, during a visit they made to America, in the month of December, 1899, recommenced their trials on the line from Chicago to New York, the length of which is considerably greater, being fully 1600 km. At the time of these experiments the electrical conditions of the line were particularly unfavorable, so much so that the resistance of the line, which is usually 10,000 ohms, was only 5700 ohms, in consequence of the heavy rains. Even the Morse apparatus worked with difficulty, and a telephone indicator could only be heard feebly at the other extremity of the line; while, as for a telephonic transmission with a copper conductor, it was useless to think of such a thing, as it was impossible to hear at the other end of the line a call made in a loud voice into the microphone. Nevertheless the inventors were able to transmit telegrams at a speed which reached 60,000 words per hour. All these results demonstrated the possibility of utilizing this new system of telegraphy, and consequently MM. Pollak and Virág set themselves to adapt their appartus to the exigencies of practice in a simple and efficacious manner. Thus, in the early apparatus used in the trials and demonstrations the sensitized paper was displaced in a helical manner before the luminous point in a closed cylinder, and once the message was finished it was necessary to take the paper from the cylinder and develop and fix the characters in a dark chamber, which process was always long and complicated. The inventors, therefore, reconstructed the receiving apparatus in such a way that all these operations are automatically performed. The

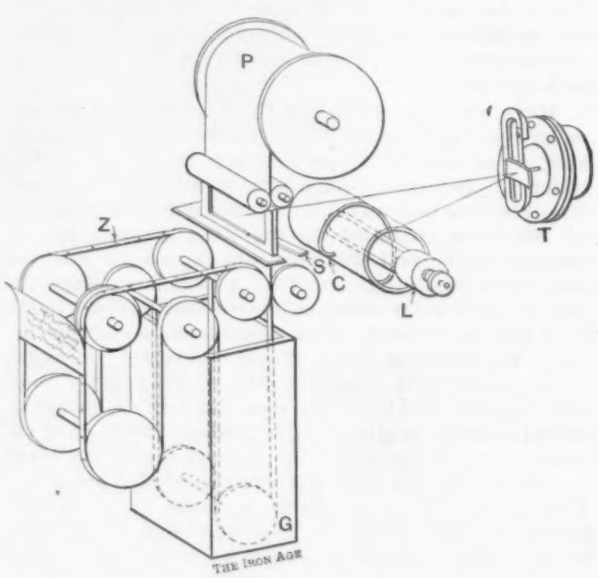


Fig. 2.—Arrangement of Sensitized Paper in Improved Apparatus.

accompanying diagram, Fig. 2, clearly illustrates this apparatus.

A band of sensitized paper, P, 7 cm. in width, is rolled in sufficient quantity in a closed box, and is displaced in a downward direction, while the luminous point moves from left to right independently of the oscillations of the mirror, in such a way that transverse lines are written on the band of paper. This is accomplished in the

following manner: A small incandescent lamp, L, with an incandescent filament of 3 to 4 cm. in length, serves as luminous source. This lamp is encircled by a cylindrical envelope, C, which can turn on its own axis, and is cut for its whole length by a slit in the form of a single turn of a screw. Through this slit there falls upon the concave mirror the luminous image of a small part of the incandescent filament, which is projected onto the sensitized paper as a very luminous point. When the cylinder turns this luminous point is displaced from right to left, the helical slit presenting a continually changing portion of the incandescent filament to the sight. As a result the reflected luminous point—that is to say, the real image furnished by the concave mirror—is transversely displaced on the paper band, moving from left to right, once for each rotation of the cylinder. While the luminous point is describing a line the sensitized paper band is moved downward in such a way that at the moment the luminous point reaches anew the left position the paper is one line lower. After being exposed to the light the sensitized paper passes into the automatic developing apparatus. In this apparatus are two bands, Z, furnished with a small catch and guided by several rollers, so as to pass successively and in the proper order the baths G necessary to develop the marks. The exposed paper band is fixed by two small rollers to the catches of the guiding bands, and passes with them through the developing baths. After passing through the last bath the paper is taken from the guiding bands and leaves the apparatus as a finished photograph. A pair of scisors, S, fixed just below the place where the exposure takes place, is used to cut at one stroke the printed paper, and at the same time stop the nonexposed portion of the band by an attached clamping apparatus. The detached portion continues its passage through the baths, finally emerging from them in a finished state. Thanks to these convenient and very simple arrangements, the receiving apparatus is started by the sending station at the same time as the transmission of the message is commenced. The stoppage is effected at the receiving station by an employee who keeps a constant watch on the transmitted signs through a ruby glass window, and who, at the moment when the signals cease, presses upon the scissors, thus cutting the band and stopping the apparatus. This altered construction of the receiving apparatus is without doubt a most important improvement; but it is always possible to say of this system that it constitutes only a partial progress in telegraphy in view of the fact that, although it is possible to utilize a telegraph line in an entirely new manner, the system allows of no reduction of the staff employed, and does not perform with sufficient rapidity and promptitude the transmission of short messages, for it is first necessary to translate the Morse signals into readable characters.

MM. Pollak and Virág therefore propose to overcome this objection, and to send messages directly in ordinary current handwriting. Their efforts have been crowned with complete success.

Messages Received in Written Characters.

By means of an ingenious combination of currents and an interesting modification of the receiving apparatus the inventors have succeeded not only in transmitting messages in Morse code, but also in all kinds of ordinary handwriting. In order to accomplish this the

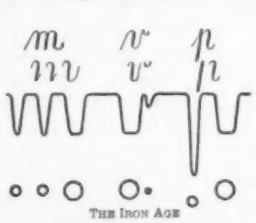


Fig. 3.—Analysis of Letters m, v, p.

mirror must receive from the telephone membrane impulsions of such a character that the light ray describes not only zigzag lines of the same hight, but composite lines which will form the complete letters.

If we examine the Latin alphabet we shall see that certain letters, such as the letters "m," "v," "p," Fig. 3, are formed of simple lines ascending or descending to different levels. If we decompose these letters into their elements (and by element we mean each part of the letter which can be written by a single ascending or descending movement of the pen, and which finishes at the same level as it commences) we shall see that each element of the letter can be written by the light ray. The letter "m," it will be seen, is composed of three elements, and the letters "v," "p" of two elements each. In order to write these letters by the light ray we must be able to vary the direction, the duration and the strength of the transmitted currents. These variations would enable us to obtain corresponding movements differing in character. For this purpose we perforate the sending slip in three series, I, II, III, Fig. 4, and the current combinations are arranged so that:

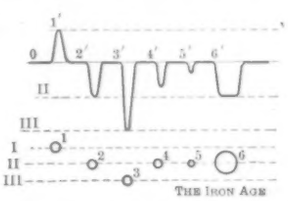


Fig. 4.—Perforations Representing m, v, p.

I gives a negative current of a certain tension.
II gives a negative current of the same tension.
III gives a positive current of double the tension.

Fig. 4 gives an example. The size of the perforations 1, 2, 3, is so adjusted that at the determined speed of the slip the duration of the currents is sufficient to permit of them exercising their full effect on the receiving telephone. The perforations 4 and 5 are smaller, and the duration of the contact is consequently smaller than is necessary to produce a movement in the telephone which is as large as could be produced in it by a stationary current. Perforation 6, on the contrary, is larger, so that the contact shall last longer than is necessary merely to send a current. These perforations give the displacements 1', 2', 3', 4', 5', 6' (see Fig. 4). From these figures it will already have been gathered that by means of perforations of different dimensions, suitably arranged, we have in our possession a means of sending automatically into line currents of different characters, corresponding to the different elements of the letters, and capable of so moving the mirror as to reproduce the elements of the letters. So the letter "m" can be transmitted by three currents—that is to say, two perforations 2 and one 6, Fig. 3. For the letter "v" we require two currents, of equal tension and different duration—that is to say, we must employ one large perforation, 6, and one smaller, 5. The letter "p" necessitates two perforations, 3, 6. But the Latin alphabet is composed for the most part of closed curves, that it is not possible to write with a luminous point which can be displaced only in an upward or downward direction; we must give this luminous point a horizontal movement also. For this purpose the letters are decomposed into two series of components, a vertical series and a horizontal series. Each component is written by a separate current, the interval between the currents being regulated so that the resultant of the components written by the telephone mirror represents the element of the letter in question. Suppose, for instance, we wish to write by the aid of the light ray the letter "l," Fig. 5, in which we find a closed curve if we decom-

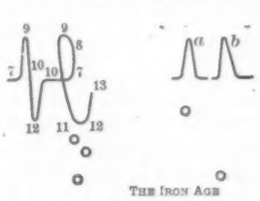


Fig. 5.—Perforations for Letter l.

pose it into its elements. We commence the letter at the point 7, Fig. 5. By means of an upward displacement, sent by the perforation I alone, we simply get a

line like 1′, Fig. 4; but when the light ray arrives at 8 we send in a second current, which causes a deviation from its original direction, and directs it to the left toward the point 9. Here the first perforation finishes, and consequently the first current is shut off, and the light ray comes back to 10. At this point the third perforation commences, which by itself will produce a displacement downward like 2′; the light ray is thus brought to 11. Here the second peforation finishes, and consequently the second current. The light ray moves a little toward the right, forms the inferior curve of the letter "1," and continues to the end of the third perforation; at this moment the third current ceases, and the light ray reaches 12. The letter "1" is then completed.

The horizontal movements of the light ray, of which we have been speaking are produced by means of the membrane of a second telephone receiving currents from a separate perforation. It is so arranged that the movements of the two membranes are communicated to a single concave mirror. This small mirror, which rests, in the old form of receiver, on two fixed points and one

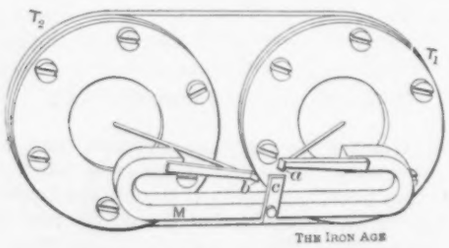


Fig. 6.—Another Connection of Mirror with Membrane.

movable point, is now mounted in such a manner that of the three points one only is fixed, 6, the other two being movable. These three points, Fig. 6, form a rectangular triangle, *a b c*, *a* and *b* being movable, and *c* fixed. If we move the point *a* perpendicularly to the paper the mirror moves on the horizontal axis formed by the points *b* and *c*, and the light ray is displaced in a vertical direction. If, however, we move the point *b*, the mirror moves on the vertical axis formed by the points *a* and *c*, and the light ray is displaced in a horizontal direction. If the two movable points are moved simultaneously the mirror reproduces the resultant of the two components, and by this means it is possible to write all the curved lines composing the letters. The two telephones previously mentioned are combined as a single apparatus, and connected with the small mirror in such a manner that the movements of one of them, T_1, are communicated to the point *a*, and the movements of the other, T_2, are communicated to the point *b*.

In this way it is possible to telegraph every letter at an extraordinary speed. The letters are decomposed into their elements at the transmitting station and combined anew at the receiving station. Fig. 3 shows the perforations for different letters and elements, according to

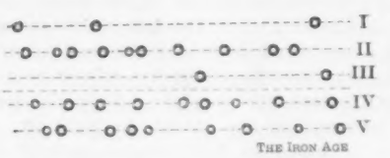


Fig. 7.—Five Series of Perforations for Word "Telegraf."

which these letters are combined in the receiving apparatus. To make possible the transmission of corresponding currents the paper is perforated in five series of perforations, Fig. 7. The series I, II, and III send the currents for the telephone T_1, Fig. 11, which writes the vertical components, and the series IV and V furnish the currents for the telephone T_2, which writes the horizontal components. Two batteries with a moderate number of elements suffice as the source of the currents. The first battery P_1 furnishes a positive and negative current of approximately the same voltage (series I and II) and also a positive current (series III) of double the voltage of the preceding two. The second battery, P_2, supplies

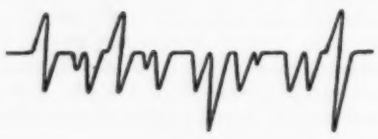


Fig. 8.—Vertical Vibrations.

a positive current of much greater strength for the horizontal components which necessitate a movement toward the right, and a weaker negative current for those moving toward the left. The five poles of these batteries are connected to metallic disks, insulated one from another and joined so as to form a cylinder capable of turning on its own axis. Over this cylinder passes the perforated slip with its five series of perforations. A metallic brush, B_1, covers the disks furnishing the three vertical elements, and a second metallic brush, B, covers the other two disks which furnish the horizontal components. Each of these two brushes collects the cur-

Fig. 9.—Horizontal Vibrations.

rents for its corresponding telephone, and the two membranes move the small mirror according to the resultant of the components. The light ray reflected by the mirror is displaced with extraordinary rapidity on the sensitized paper, producing thus a tolerably clear and readable handwriting. To obtain a perfect handwriting it is necessary to protect the vertical components from the influence of the capacity and self induction of the line. For this purpose the same measures are adopted as in the Pollak-Virág Morse writing apparatus. A self induction coil is inserted in parallel at the sending station I_1. But the nature of the letters necessitates that the horizontal components be slightly retarded. For this reason when the line is only of medium length no correcting coil is inserted in this circuit; or, if a coil is inserted, it is only

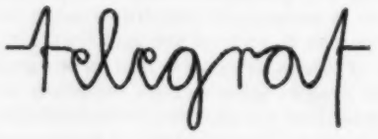


Fig. 10.—Resultant Word.

of small dimension, I_2. The rapidity of the vertical displacements is represented in Fig. 5, *a* and the horizontal displacements in Fig. 5, *b*.

The self vibrations are avoided as hitherto by means of condensers. It is even possible by means of the insertion of other condensers to modify the phase differences between the vertical and horizontal components. It is not necessary, as we might be tempted to believe, to employ two pairs of conductors, one pair for each telephone. One conductor in the form of a loop is sufficient, as will be seen by reference to Fig. 11. The telephone T_1 is inserted in the loop, and for the telephone T_2 the parallel lines form the adductor and the earth serves as return. P_1 is the battery for the vertical components. I, II, III are the sectors which, by connection with different points of the battery P_1, send the necessary currents into the loop L_1, L_2 by means of the brush B_1. In this loop is inserted the telephone T_1, and parallel with it are inserted the condensers C_1; this telephone moves the mirror in a vertical direction, and the induction coil I furnishes the corresponding correcting currents. The coil I_1 is connected in its middle with the brush B_2, which passes over the sectors IV and V, and furnishes the current from the battery P_2 for the horizontal components. These currents pass in parallel by the loop, and in opposite directions, through the telephone T_1,

which does not respond to them. They arrive finally at the telephone T_2, which moves the mirror in a horizontal direction, and return by earth to the battery. The condensers C_2 are joined in parallel with the telephone T_2, and resistance can with advantage be inserted in this

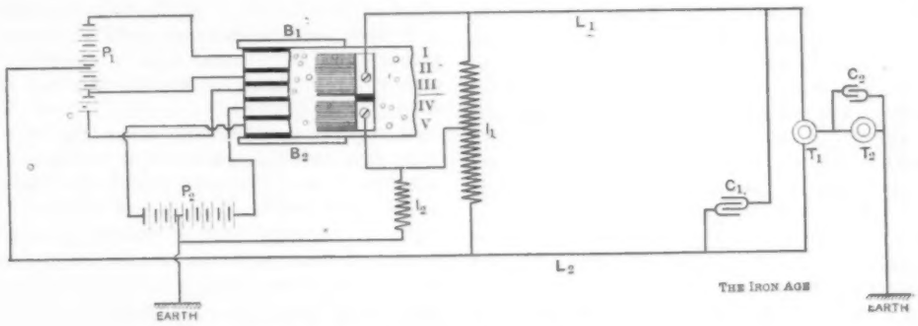


Fig. 11.—Arrangement for Written Characters.

circuit. A small induction coil, I_2, is, as already stated, used when necessary to correct the second circuit.

Fig. 7 shows the perforations for the word "telegraf," and the vibrations executed separately by each telephone are shown in Figs. 8 and 9; the written word, Fig. 10, is the resultant of the combination of these two sets of vibrations. The perforation of the paper band is performed by a perforator so constructed that with a single impression it is possible to produce all the perforations necessary to send a complete letter.

Results Obtained.

It is obvious that with this system there is no necessity to syncronize the receiver and the transmitter, and the working of the apparatus is thus rendered much more simple and effective. If the sensitized paper is accelerated or retarded, or if the movement of the sending slip is made faster or slower, the only result is that the writing is compressed or elongated. It is equally evident that by means of a distributer the current can be sent directly into line, which would permit the employment of some 30 sets of apparatus on a single line. Although by this method the perforations are done away with, the system with its perforated paper slip is, nevertheless, so much more economic, and offers, in my opinion, so many advantages, that ere long preference will always be given to the latter system.

The Pollak-Virág writing telegraph is not only capable of facilitating the transmission of a considerable number of messages, but it is equally capable of largely reducing the price of telegraphic communications.

Thanks to the moral and material support given to the inventors by His Excellency the Hungarian Minister of Commerce, we have been able to try this new invention on a working line. The Director-General of Posts and Telegraphs, in fact, placed at our disposal in a gracious and liberal manner four telephone lines running from Budapest to Pozsony. These four lines were joined through to the laboratory of the United Electrical Company at Budapest, and the receiver and the transmitter were inserted in the circuit in such a way that the current traversed the line in form of a loop of the length of 400 km. (230 miles). The resistance of the line was 2000 ohms. The messages transmitted were written in a very correct and readable manner, and if you will permit me I will show you some of these messages which were transmitted at the speed of 60,000 words per hour.

At the kind request of the French Government we are going to make some trials in the course of the next few weeks between Paris and Lyons, and, for my part, I am fully persuaded that the results we shall obtain will brilliantly demonstrate all the advantages of the Pollak-Virág system. There is no doubt that with this invention we have entered upon a new epoch in the history of the development of telegraphy, and the Pollak-Virág system constitutes one of the most interesting successes obtained of late years in the domain of the application of weak currents.

The custom house at the port of Bath, Maine, has issued a report of vessels built in the district in the calendar year 1900. It shows that the shipbuilding in tonnage surpassed that of any former year, save 1882, when 42,000 tons were built. In 1900 the total was 41,532 gross, or 35,561 net, distributed among 35 craft. The individual craft were as follows: One ship, gross tonnage, 3292, net 2887; four steamers, gross 850, net 474; 15 schooners, gross 23,731, net 20,864; 13 barges, gross 13,614, net 12,205; two sloops, gross 45, net 31.

Thicker Boiler Plates.

R. S. Hale, consulting engineer of the Mutual Boiler Insurance Company of Boston, has prepared the following report on boiler plates, which is of general interest to steam users:

It is not many years since the boiler insurance companies set their faces against anything thicker than 7-16-inch plate for plates exposed to the fire, and nearly every one remembers the time when the United States rule forbade plates thicker than ¼ inch to be exposed to the fire; I should not want to say that this rule was not still in force. One of the prominent engineers of the country last year specified 17-32 plates for some boilers to be insured by the Mutual Boiler Insurance Company, which, after some consideration, was approved.

The size of boilers now made is larger than was formerly considered the best practice. Not many years ago a 60-inch boiler was the standard, to day 72-inch is the more common, and many boilers of 78, 84 and even 90 inch are being built. Pressures have also increased. Formerly the standard pressure was 80 pounds; to-day it is 125 and 150 pounds. Now the larger the boiler and the higher the pressure that is carried the lower will be the cost of installation and of operation, and the limit to further increase of size or pressure is the limit to the thickness of the shell plates, which at present are seldom made thicker than ½ inch. For steel of 60,000 pounds tensile strength, with a quadruple riveted joint of 90 per cent. efficiency, and a factor of safety of 5, this limits the pressure to 180 pounds in a 60-inch boiler, to 150 pounds in a 72-inch boiler and to 120 pounds in a 90-inch boiler, while, with 7-16-inch metal, which is more commonly used than ½-inch, a 72-inch boiler with triple riveted joint carries only 125 pounds pressure. If 90-inch horizontal tubular boilers could be made to carry 150 or 180 pounds of steam pressure, they would compare very favorably with even the best water tube boilers in price and economy, and it will therefore be of interest to determine whether thicker plates than ½-inch may not be used.

It is interesting to note the reasons for the old and present limits.

If the plates are not exposed to heat or are exposed to the heat of the steam only, there is apparently no difficulty with plates 1 inch thick and even more, but if plates are exposed to the fire it is thought they reach a dangerous temperature. What temperature will they reach? I am not aware that any absolute experiments have ever been made of the temperature of the surface of the water side of a plate, since such tests would be very difficult, but the work on cylinder condensation in engines, and in fact almost all work on conductivity, indicates clearly that the water side of a plate never exceeds the temperature of the water in contact with it by

more than a very few degrees, if it exceeds it at all. With oil or scale on the water side this would not be the case, but oil or scale would affect thick and thin plates by the same amount.

On the other hand the side of the plate exposed to the hot gases is, it is known, much cooler than these gases. This difference has also never been measured directly, but the temperature of the plates may be computed as follows: For a constant temperature of the inside of the plate the outside of the plate will reach its maximum temperature when the plate is transmitting the maximum amount of heat. Boiler tests and conductivity tests indicate that the maximum heat transmitted per square foot per hour is the evaporation of from 20 to 50 pounds of water from and at 212 degrees, or, taking the higher figure, 43,800 B. T. U. per hour. The conductivity of iron is given variously at from 0.11 to 0.18 in the C. G. S. units. If we take the conductivity as 0.1 and the flow of heat 48,300 B. T. U. per square foot per hour, we find that the difference of temperature between the inside and outside of a 1-inch plate is only 168 degrees F. This probably represents the worst ordinary conditions, though for what is known as blow pipe action the difference may be more. For a ½-inch plate the girth seam is 1 inch thick, and 168 degrees would be the greatest difference of temperature between the inside and outside. If the steam pressure is 150 pounds, the temperature of the water side will be 365 degrees, and of the outside of the plate, 537 degrees. If the plates are 11-16 the outside will be 63 degrees hotter, or 600 degrees, the inside being the same. Now, in steam superheaters, which are used extensively abroad, the temperatures of the steam reach 700 degrees, and yet the thin steel tubes of the superheater do not suffer, although they must be themselves at a higher temperature than the steam, and above 700 degrees.

Hence it follows that even 11-16-inch plate will not reach as high a temperature as is used without trouble in superheaters.

The old ¼-inch rule gives an interesting result. The water side of a ⅜-inch plate in a boiler worked at 100 pounds would be 338 degrees and the fire side 391 degrees in the body of the plate where it is ⅜ inch thick and 464 degrees at the girth seam, where the thickness is ¾ inch. The temperature 391 degrees corresponds to only about 210 pounds pressure, at which pressure many boilers are worked to-day. Now the ⅜-inch plates in the old days gave as much trouble from blisters in the body of the plate, where the metal was only ⅜ inch thick, and the temperature of the fire side not over 391 degrees, as they did at the girth seams, where the temperature ought to have been greater.

These facts show that the plates of superheaters and high pressure boilers are to-day worked at much higher temperatures than occurred in the old iron plates which gave trouble, and it follows that the reason for thin plates lay in something more than the mere question of temperature. It was probably due to some difference in constitution between the old iron plates used when the ¼-inch rule came into effect and the steel used to-day in superheaters and high pressure boilers. The laminations of the iron plates are a sufficient reason to account for this at once. If a lamination existed there would be an additional resistance to heat transfer at the lamination, and the outside of the sheet would naturally reach a very high temperature and cause trouble by blistering, while this would not occur with homogeneous steel.

Now this theory, that it was the laminations in the iron plates, and not the actual temperature reached, that was the foundation for the old limit to thickness, is only a theory, but when it is combined with present day practice of using ⅜, 7-16 and ½ inch plates of homogeneous steel, it indicates that we probably have not yet reached the limit of thickness.

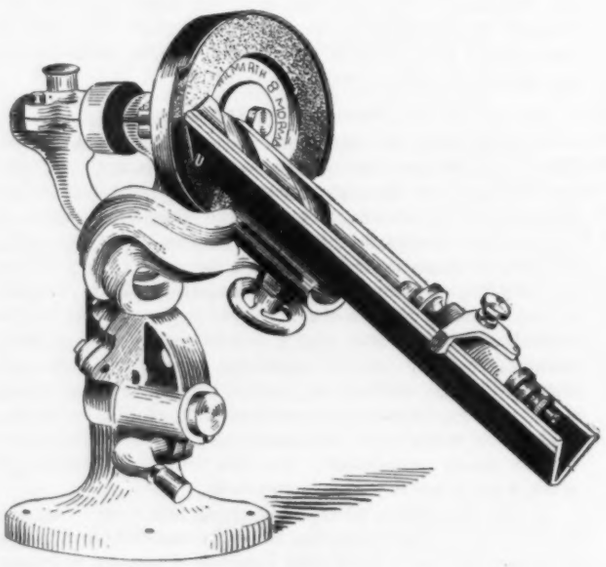
The Mutual Boiler Insurance Company has to-day under its insurance many boilers with ½-inch plates, some of which have been in service over ten years. Of these only one has given trouble, which is as good a record as would be expected with 7-16-inch plates. It therefore is probable that ½-inch is not the limit, and we are prepared to approve specifications calling for 9-16-inch plate of the best steel, which, with quadruple riveted joints, will allow 170 pounds pressure for a 72-inch boiler, with a factor of safety of 5, or a pressure of 135 pounds in a 90-inch boiler, with the same factor of safety.

A 90-inch boiler can easily and economically be worked to 300 horse-power, and would cost, set and in place, about $2000, or $6.66 per horse-power. Such boilers have been worked at good economy to 400 horse-power, and with some loss of economy to 700 horse-power. At a rating of 400 horse-power the cost is only $5 per horse-power.

Of course this does not mean that we will guarantee that these thicker plates will never give trouble, any more than we guarantee that ½ or 7-16 inch plate will never give trouble. It is our opinion, however, that there is but slight risk of trouble, and no more risk of explosion than with the thinner plates, and we recommend such of our members as want a cheap, good, high pressure boiler at least to consider the use of such plates.

The Yankee Drill Grinder.

The illustration given herewith shows a new style of drill grinder which has been brought out by the Wilmarth & Morman Company, Grand Rapids, Mich., who are successors to the Fuller Mfg. Company, late of Kalamazoo.



THE YANKEE DRILL GRINDER.

This grinder has a capacity to handle any drill ranging between No. 40 and 1¼ inch, which gives it a range sufficient for most machine shops. The method of operation is exceedingly simple. The drill is dropped into the V-shaped holder and the tail stock is brought up until the drill is carried in contact with the wheel and then fastened. This grinder avoids the necessity of making a large number of adjustments before a drill is ready to be ground. It is built upon such lines that the very size of each drill determines its proper position in the holder. For instance, a ½-inch drill always stops at a certain place in the holder and connot possibly occupy the position intended for a ¾-inch drill. The company have also brought out another new style which has a capacity for grinding drills from 1-25 to ⅝ inch, and is intended for shops using very small drills.

The work of dredging for the new channel in New York harbor will begin within a few days. The channel will be 2000 feet wide and 40 feet deep and will extend for a distance of 8 miles. The dredging vessel, specially built for the purpose, is one of the largest ever constructed, having a tonnage of about 10,000 tons. She will remove a great part of the bottom land by means of suction tubes, the soil being disposed of in hoppers. When the hoppers are full the dredger will proceed to sea and dump her cargo in deep water.

Industrial Arbitration.*

BY CHAUNCEY H. CASTLE, PRESIDENT STOVE FOUNDERS' NATIONAL DEFENSE ASSOCIATION.

As a representative of the Stove Founders' National Defense Association, I have been requested to state my observations of, and the experiences of our association with, what is known as "Industrial Arbitration."

Regarding the importance of this subject at this time nothing need be said by me. A very large portion of the cost of a stove, range or furnace is represented by the expenditure for labor of various classes in the construction of it, and the amount paid for molding constitutes a material percentage of the entire labor cost.

The Iron Molders' Union.

The Iron Molders' Union is one of the oldest, strongest and most aggressive labor organizations in this country. Almost immediately after entering the business of stove manufacturing, during the year 1865, in a managing capacity of a department connected with labor, I became involved in a contest, followed by a strike, inaugurated by the Molders' Union. At frequent intervals, during a long series of following years, there was a recurrence of molders' strikes, or there was a lockout. In some cases the strikes were for an advance, while at other times they were against reduction in the prices paid for molding. In other instances there were other issues, but at any time a strike was liable to be made upon slight provocation, and, as it seemed to me, without deliberate consideration.

In almost every case in which I was in any manner responsible, or that came under my observation, the issue was ultimately adjusted, after a more or less protracted period of idleness and of bitter contest, by means of conference between representatives of the parties at interest; and I was never able to comprehend why such conference might not better have occurred in advance of the issue being made, rather than after, thereby avoiding, if possible, unnecessary loss of money through waste of time. However, there seemed to be no disposition to try to discover a method.

From time to time there were suggestions of resorting to arbitration in settling or avoiding strikes. Such came from employees and were not favorably entertained by employers. These labor disturbances, through strikes by molders, grew from bad to worse in our line of business, and from 1882 to 1884 were extremely grievous. Various groups of stove manufacturers met and considered methods of meeting organization with organization. Some men of large experience who entertained extreme ideas, together with others of little experience, were disposed to make common cause against labor organizations in all cases wherein an issue should be made by such against any member of a contemplated organization. Others, who also possessed large experience, insisted that a more conservative policy should be pursued, that thorough investigation of any issues should be made, and that a member should not be sustained until it was proven, after affording all parties an opportunity to be heard, that the demands were unjust and that just terms could not be had. This idea finally prevailed.

It was also the conclusion that it would be to our advantage to profit by the many years' experience of the Molders' Union by forming our organization, to an extent, along the lines at that time in use by that organization.

The Defense Association.

Accordingly the Stove Founders' National Defense Association was formed in 1886, embracing a large proportion of those who manufacture stoves most extensively. An Executive Committee was selected and the man of largest experience on both sides of labor questions connected with the business of manufacturing stoves, Henry Cribben of Chicago, was elected president. We proceeded to formulate our articles and by-laws, having due appreciation of the skill and ability of the leaders of the opposition.

A short time after our organization was formed we were obliged to contend with a serious condition. A demand was made upon one of our members by the Molders' Union of St. Louis for a large increase in the rate of wages. The demand was promptly followed by a strike. Our committee proceeded to St. Louis to investigate. After thoroughly informing themselves, we offered a partial concession of the increase demanded, to go into immediate effect, together with an additional further increase at a stated time, a few months later on. This offer was rejected, and we entered upon a contest which resulted in the complete triumph of our organization, although at large cost to us, and to our member who was involved, and at incomputable cost to the Iron Molders' Union of North America.

We engaged in other contests with the Iron Molders' Union during the four or five years ensuing, each of which resulted about as did the first. The Stove Founders' National Defense Association had at all times manifested a willingness and desire to confer with employees, or with organizations of employees, upon any question of mutual interest, with a view of saving trouble and expense through satisfactory adjustment. The general officers of the Molders' Union came to appreciate the possibilities of advantage of such a course, and early in 1891 an arrangement was made for a conference between five representatives of their organization and an equal number of ours.

Conciliation.

Such conference was held in Chicago late in March, 1891, and during a session of three days a plan of consideration and adjustment of grievances, which was called "arbitration," but which may more properly be called "conciliation," was unanimously agreed upon by the ten representatives, and was approved of and ratified by the respective organizations. The representatives of the molders urged the strictly arbitration plan, and as the word has a meaning of justice and fairness, our representatives in general were disposed to favorably entertain it. However, some of our representatives contended strenuously that our members could not properly, and therefore would not, enter into an agreement that would obligate them in advance to submit important questions affecting their business to the decision of an odd and disinterested man, who had no knowledge of their business and its requirements, and who might be biased. The arguments upon this question of arbitration were earnest and extended. It was contended:

First—That the odd man, who was disinterested, and who would probably have no knowledge of the business, would be alone responsible, for the reason that the representative of neither party would be liable to concede, even if convinced, for those he represented would expect him to win through the odd man, if possible. The question was asked of one who was most strenuous for arbitration, "Would you, if a member of an Arbitration Committee, representing your side, concede anything of importance, even if you became convinced it was right to do so?" And his reply was, "No, I should feel obliged to win, if possible, through the odd man."

Second—That it would be extremely difficult to secure the services in each case of such a man as would be needed and who would be acceptable to both parties, because few such men would be willing to serve, even when agreed upon, as the position would not be a desirable one to a really good and competent man.

Third—Should an agreement to arbitrate be made, issues would multiply and some of the demands would be extreme, unjust and even ridiculous. Such issues would be made, however, only because there would be a chance to gain through the odd man, while there could not possibly be a loss.

Fourth—The employer could not expect to stand an even chance with the employee, aside from the merits of the question, in an average of a number of arbitrations, because of the facts that public sympathy is always with the workmen, that they have many votes, that they have large patronage to bestow upon every business and profession, and that they do not hesitate to exert to the utmost of their value, in such matters, such influences as accompany these conditions. So that at any rate, if in doubt, the arbiter, being inexperienced and without

* An address before the National Arbitration and Conciliation Convention at Chicago.

knowledge of the business, would be likely to incline to favor the employee.

Therefore it was not reasonable to expect our members to be willing to accept such an arrangement. In other words, they would not be willing to submit an important question largely affecting their busines interests to the casting up of a chip, "wet or dry," with a large majority of the chances in favor of its falling wet side up if their representative selected dry; that if the award was unjust to employees, they would not work under it, and if such as would operate to the ruin of the business of the employer, he could not long abide by it.

It was urged that it were far better to submit any issue to a committee composed of an equal number of the representatives of the molders and of the manufacturers as a last resort, each of whom had a knowledge of and an interest in the business, who should strenuously strive to reach an agreement, understanding that in case of their failure to do so an open rupture and bitter contest must be the result.

Consideration was also given to avoiding, to the extent that might be possible, the inconvenience and expense of calling upon such a conference committee. It was agreed that employers and employees who were directly affected ought, in each case, locally, to make special efforts to themselves settle any disagreement, and that they, failing to do so, either or both might send a statement of grievances to the officers of their general organizations, and that then the presidents should make investigation and try to adjust the dispute before the conference committee should be called.

Arbitration Resolutions.

After a thorough discussion, extending over three days, as previously stated, the following resolutions were unanimously adopted by the ten representatives:

Clause 1.—Resolved, That this meeting adopt the principle of arbitration in the settlement of any dispute between the members of the International Machinists' Union of North America and the members of the Stove Founders' National Defense Association.

Clause 2.—That a Conference Committtee be formed consisting of six members, three of whom should be stove molders appointed by the Iron Molders' Union of North America and three persons appointed by the Stove Founders' National Defense Association, all to hold their offices from May 1 to April 30 of each year.

Clause 3.—Whenever there is a dispute between a member of the Stove Founders' National Defense Association and the molders in his employ (when a majority of the latter are members of the Iron Molders' Union), (this exception or qualification was afterward eliminated), and it cannot be settled amicably between them, it shall be referred to the presidents of the two associations before named, who shall themselves or by delegates give it due consideration. If they cannot decide it satisfactorily to themselves they may, by mutual agreement, summon the Conference Committee, to whom the dispute shall be referred, and whose decision by a majority vote shall be final and binding upon each party for the term of 12 months.

Pending adjudication by the presidents and Conference Committee, neither party to the dispute shall discontinue operations, but shall proceed with business in the ordinary manner. In case of a vacancy in the Committee of Conference, it shall be filled by the association originally nominating. No vote shall be taken except by a full committee or by an even number of each party.

These were reported to, approved of and ratified by both organizations, thus becoming agreements, and superior, as to any question between the two organizations or members of the same, to any article, by-law or rule of either that might be in conflict with them.

You will observe that while we, in the first clause, adopt the principle of arbitration, we do not, strictly speaking, adopt the practice of it, but that instead we practice conciliation through the conference.

Adjustments so reached are by far the most sure method of properly protecting important interests, and conference constitutes a much better and more economical method of correcting unjust conditions than do strikes and lock outs.

What manner of man must he be who prefers going into an expensive lawsuit to settle a dispute regarding a business question rather than confer with the opposite party upon the merits of it? You will also observe that we undertake to avoid strikes and lock outs by agreeing that pending adjudication by the presidents and the Conference Committee neither party to the disputes shall discontinue operations, but shall proceed with business in the ordinary manner.

The Agreement Tested.

You will readily believe that there has been some trouble connected with carrying out this agreement regarding continuing operations, and this notwithstanding it is to the immediate advantage of all parties. There are many radicals among employers as well as among employees, and such are liable to consider that their natural rights are being abridged if they are not at liberty to close their works or to strike, as the case may be, whenever they have, or believe they have, a serious grievance.

A shut down or a strike for a day or two, where an issue has been made, has occurred upon some occasions in violation of this agreement, ordinarily through failure of the parties to understand their obligations; but work in each case has been resumed when the matter has been brought to the attention of the party violating or when their officers have remonstrated. This clause is a very important one aside from the saving of time and money accomplished through it, as it enables all parties to proceed with adjustments in a cool and deliberate manner without excitement or anger. It is much more easy to adjust a difficulty before a rupture occurs than early afterward.

During nearly nine years of practical operations under this conference agreement it has not been necessary to assemble the Conference Committee, provided for in clause 3, in more than one or two instances, although hundreds of issues have been made and grievances sent in. Almost without exception they have been satisfactorily adjusted by the presidents themselves or their representatives delegated for the purpose, and no strike by molders or lock out by the manufacturer has prevailed in any factory of any member of our organization for more than one or two days, and even such have been rare.

Since the adoption of the plan of conference in 1891, as stated, we have held a conference meeting of a somewhat similar character almost every year at some time in the month of March or April. Various additional clauses have been adopted and ratified. Most of these are not of general interest, as they pertain to foundry rules and practices.

Clauses 5 and 6, adopted in 1892, however, relate to general rates of molders' wages and a method of arriving at the same, and are as follows:

Clause 5.—The general rate of molders' wages should be established for each year without change.

Clause 6.—When the members of the Defense Association shall desire a general reduction in the rate of wages, or the Iron Molders' Union an advance, they shall each give the other notice, at least 30 days before the end of each year, which shall commence on the first day of April. If no such notice be given, the rate of wages current during the year shall be the rate in force for the succeeding year.

Molding Prices.

Under this agreement as to molding prices, we, in 1894, because of general depression in business, and in rates for labor, would have been justified in demanding a considerable reduction in the rates for molding, but, after consultation among ourselves, we concluded that, inasmuch as the workmen would be only partially employed, a reduction would be a serious hardship, and that, as the depression was probably to be but temporary, we had better not insist upon it, although we had no doubt it would be readily conceded.

We did, however, in conference, make an arangement whereby it was agreed that in the event of a reduction of rates for molding being secured during the year by a stated considerable percentage of stove manufacturers in this country who were not members of our organiza-

tion, the opportunity for reduction should then be open to us. We were not obliged to avail ourselves of this arrangement. We tided over the period of depression, although it was not temporary but protracted, to the vast advantage of the molders, and possibly without detriment to ourselves. We have not at any time demanded a general reduction under the rules. So soon as prosperity began to bud the molders began to insist that notice be given in ample time, that they would be ready to participate from April 1 following.

A demand for an advance was made, a conference convened, and it was agreed that as we made no reduction when general reductions occurred, the time for us to advance had not arrived, and that the rates then prevailing should remain the rates for the year terminating April 1, 1898. Early in 1898 the molders again demanded an advance to take effect April 1, and a conference was called to consider it. After thorough discussion by the committee an advance of 10 per cent. in molders' wages for the year to terminate April 1, 1899, was conceded. In March, 1900, another conference was held, at which a further advance of 5 per cent. was made, to take effect on April 1 last.

Thus it would seem that from the standpoint of the employee our plan of conference has been demonstrated to be a remarkable success. By means of it a long period of depression was passed without any reduction of their rates, and when a time of general prosperity arrived they were enabled to promptly share in it without strife and without loss of an hour's time. So that those molders working in the foundries of the members of our association alone are direct gainers thereby to the extent of hundreds of thousands of dollars.

The employer derived comfort and satisfaction from the stability and reliability secured, as well as from the peaceful and harmonious relations existing in this department of his business. And I have no doubt such conditions inure to his pecuniary advantage when secured by so just and fair a method.

While our association has no agreement for use of this plan with workmen in departments of our business other than molding, we have practiced it in some of them in a partial manner only, by common consent, with good results. Some strikes have occurred in such other departments that were more or less serious, each of which would have been entirely avoided had the method been applied in full under an agreement.

Success of the Plan.

Our plan had been in successful operation for more than five years before I observed any important reference to it, or to a similar idea, from any source other than such as was directly or indirectly associated with the foundry business or that had received it directly from our organization. However, in 1896, what seems to me to be a very thorough indorsement came from England.

An Associated Press dispatch was printed in the newspapers, dated New York, November 28, which contained the following:

"Samuel Woods, the English labor leader and ex-member of Parliament, secretary of the Trades' Union Congress of Great Britain, arrived on the 'Campania' this morning. Mr. Woods comes to the United States as a delegate from the Trades' Union Congress of Great Britain to the convention of the American Confederation of Labor at Cincinnati, December 14. He is accompanied by John Mallinson, English labor leader and delegate to the convention.

Interview.—"I do not believe in strikes," said Mr. Woods; "I have little faith in arbitration, either. I am a firm believer, though, in a policy which I call conciliation. If interested parties, who know all about a dispute, cannot settle it, how can a third party, who knows nothing at all about it, help them to reach an agreement?"

As to how important an indorsement of our plan this is, I do not know, but surely it is thorough. I do not believe that any other method of adjustment of industrial questions, or disagreements between employers and employees, has been devised and practiced that promises as nearly universal satisfaaction and advantage to all concerned as does our agreed upon method of conciliation through conference, and I am sure that genuine arbitration, voluntary or compulsory, does not.

The Bessemer Coke Company.

The Bessemer Coke Company of Pittsburgh seem to have been entirely misrepresented by the dispatches sent out from Latrobe as to the cause of the recent labor trouble at the Duquesne coke plant of the company near Bradenville. The dispatches sent out from Latrobe, and recently published in various papers, represented the Bessemer Coke Company as trying to reduce the wages of mining, in that district, to the basis of wages paid in the Connellsville region, which is not the case. It is also repeatedly claimed that the coal in the Bradenville district is harder than is found in the Connellsville coke region proper, and on this assumption a higher rate for mining has always been paid in that district; but, as a matter of fact, the coal in the Bessemer Coke Company's Duquesne plant is considerably softer than the coal in at least two of their other mines in the Connellsville region proper, it being necessary to use powder for blasting the coal in the latter two mines, whereas this has never been necessary in mining the coal at the Bradenville works. Coal in the Connellsville region is mined and paid for by measurement, while the coal in the Bradenville district is weighed and paid for by the ton. The trouble, according to the statement by a representative of the Bessemer Company, grew out of a request from the company to change from the weighing system to the system of measurement, similar to the custom in the Connellsville region, and not from any attempt to reduce the wages.

The Bessemer Coke Company only recently acquired the ownership of the Duquesne plant at Bradenville and have met many difficulties in getting it into proper shape for operation. The worst difficulty they had to meet with was the weighing of the coal. The company had requirements for a run of 450 to 500 wagons of coal per day, but only had weighing facilities for about 300 wagons; consequently they were forced to make other arrangements, and the measurement system seemed to be the only clear way out of the difficulty. The wagons used are all the same size, of uniform capacity, and the men were asked to weigh any number of wagons from one to ten, or more if they chose, and take the average weight of the number of wagons as the price to be paid for mining; the wages to be paid for mining based on this measurement to be continued at the 42-cent rate, which is the prevailing rate paid in this district, the company not desiring to make any change in the mining rate. It was also proposed that these averages of weights were to be made at frequent intervals, if the men at any time so desired. There is always dissatisfaction over the weighing system where coal is mined by weight, over the scales getting out of order, disputes between weigh master and check weighman, and many other matters that are detrimental both to the men and company alike that the management hoped to abate. It would have perhaps been well for the miners to have tried the change. The system of paying for mining by measurement, where frequent weighing tests could be made to determine averages, has many advocates in the Connellsville coke region.

So rapid have been the strides in the successful transmission of power by electricity over considerable distances that the limiting factor is no longer the length of the transmission line, but is now merely a question of the market price at which the power can be sold. Power at a loss of only 8 per cent. on the line is to-day being transmitted 80 miles in California. The electrical equipment of water powers heretofore considered so inaccessible as to be of no commercial value are to-day among the most desired of all properties. The electrical transmission of power from coal mines—using slack for fuel—is now beginning to attract the attention of capitalists, and at the close of the year 1900 there are several plants of this character in different sections of the country which have proved to be great commercial successes.

The Sargent Company's Tropenas Steel Castings.

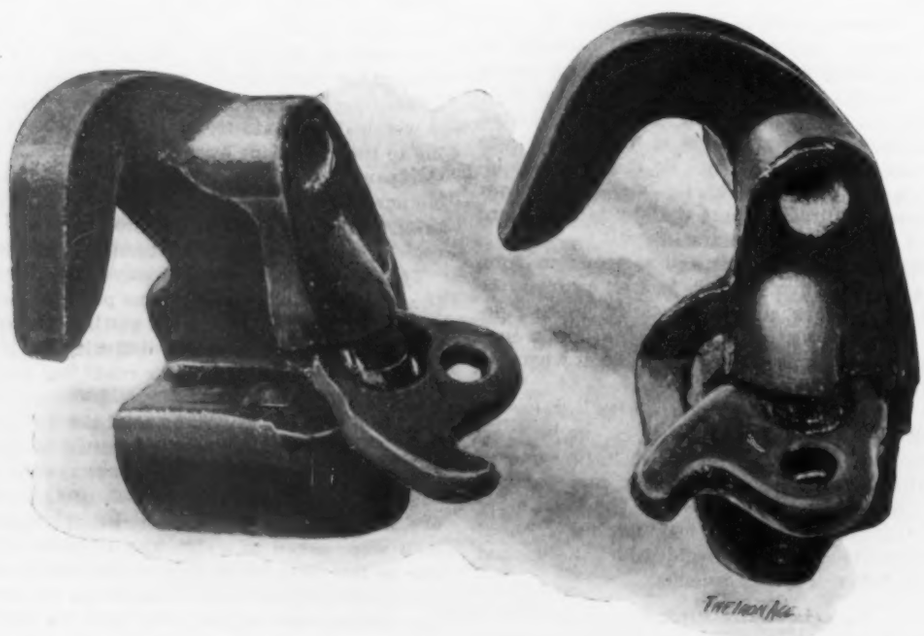
The Sargent Company, whose office is in the Old Colony Building, Chicago, have within the past year installed a Tropenas steel casting plant as part of their new works at Chicago Heights. They have erected three Tropenas converters and now have the largest plant of this kind in the United States. These converters take a charge of 2 tons each and their total capacity is rated at 50 tons a day. Hitherto the company have not advertised themselves as manufacturers of small steel castings nor sought such business in any way. Nevertheless they have had very considerable orders for work of this character, which they formerly filled in crucible steel or as best they might in open hearth steel, and it is through their experience in the manufacture of steel by these two processes that they have been led to prefer the Tropenas process for small castings. They adopted this process after a careful study of steel making at home and abroad, thoroughly investigating the Tropenas process in Europe, where it is in successful operation in some 40 different plants. They started their first converter last March. Their success in using this process led to the enlargement of the plant until it now comprises three converters, as above stated.

The Tropenas process consists in the use of special converters, in which pig iron and selected scrap previously melted in a cupola are subjected to an air blast of from 3 to 4 pounds pressure per square inch directed horizontally across the top of the molten bath. This action generates intense heat by the combustion of the metalloids in the pig iron, and after a period varying from 16 to 20 minutes, depending on the quality of the charge used, there remains in the converter a bath of nearly pure iron. Addition is made of ferromanganese or ferrosilicon, or both, to bring the silicon, manganese and carbon contents up to the specified proportions, when the metal is drawn off into a ladle and poured. The process is very simple and the product very regular.

The peculiar advantage of the process lies in the fact that the resultant metal is much hotter and consequently more fluid than that produced by any other method thus far in use. And it is this fact which makes it valuable in the manufacture of small or intricate castings, as it can be poured over the lip of the ladle in as small a stream as desired and will run through thin sections, producing solid casting free from pin holes and cracks. Any grade of metal is readily produced by varying the additions. It is consequently valuable not only in the production of low carbon steel of maximum permeability, so much desired in electrical castings, but also in the production of special grades of hard steel for mining machinery parts and other purposes.

The company are at the present time producing from 20 to 30 tons of these castings per day. They are turning out all classes of general machinery, railroad, mining and electrical castings, which have been shown by practical tests to be fully equal in physical properties and chemical composition to the best open hearth steel. The characteristics of this steel have been the subject of investigation by the United States Government, whose inspectors took every pains to satisfy themselves of its quality before accepting it. They pronounced its physical qualities equal if not superior to those of open hearth steel.

Miscellaneous castings, unless otherwise specified, are made of mild steel, which is tough and machines readily, having a tensile strength per square inch of 65,000 to 75,000 pounds with an elongation of 20 to 30 per cent. They are solid and true to pattern and can be furnished in much less time and at a lower cost, particularly where special dies and appliances for forging are made. The castings have a smooth surface and the metal will stand forging and welding. These castings do not require annealing, and consequently the day after a pattern is received at the foundry it is possible to turn out a day's work, running from one to several hundred pieces, and the day thereafter the casting may be cleaned and ready for shipment.



THE SARGENT COMPANY'S TROPENAS STEEL CASTINGS.

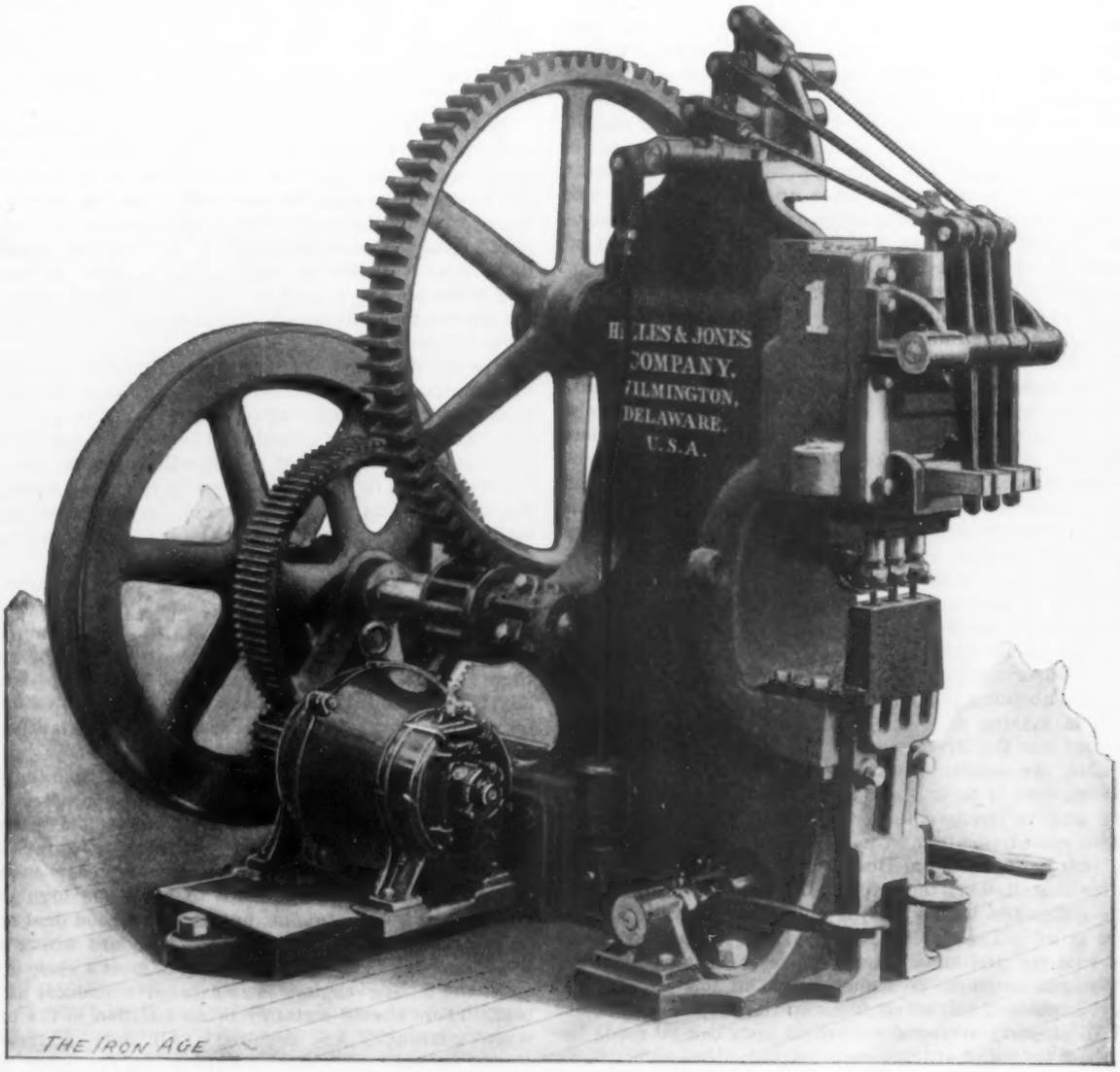
Where possible all patterns are molded by machinery, which insures uniformity. The company state that all kinds of work in the shape of special castings for automobile construction, general railroad, mining, electrical and machinery parts calling for lightness and strength can be made in Tropenas steel with satisfactory results. Heretofore a great majority of small castings requiring great strength have been supplied by the makers of semi-steel or crucible steel. The former metal, of course, does not have the properties of actual steel, while the latter is quite expensive, but both processes necessitate considerable time for the turning out of even moderate sized orders.

The company, in turning their attention to the production of small castings by this process, claim to have made a very great step in advance from a metallurgical point of view and believe that their move in this direction will be appreciated when it is generally known. An illustration is herewith given of a casting made of Tropenas steel, which is not only quite intricate and there-

fore would be exceedingly difficult to make with crucible or open hearth steel, but at the same time presents an illustration of skillful work on the part of the molder. This casting is in two pieces which are connected with each other so that the united portions form a loose link, permitting the two pieces to move easily independent of each other.

The Hilles & Jones Special Punching Machine.

The special punching machine for bridge and structural work, built by the Hilles & Jones Company of Wilmington, Del., has several points of advantage over the ordinary type of structural punch. The machine is provided with three punches and dies, and each of the punches is operated by a separate gag, all of the gags being controlled by independent foot levers. In a great many plates or structural shapes there are two or three different diameters of holes which have to be punched, and much time is lost where the punch and die have to be changed for these different sizes or the material removed to another machine. This either necessitates an extra handling of the material or the men waiting while the change is made. By the use of the three punch stocks with three different sizes (11-16, 13-16 and 15-16 inch diameters, say) this delay is overcome and the plate or bar has all the holes punched at one pass through the machine. It will be understood that only the punch which has the gag pushed in will go through the material, the others simply resting on the plate when the sliding head comes down. Owing to this method of controlling the punching fixtures there is no clutch on the machine, the sliding head running at all times when current is on the motor. The motor itself is conveniently arranged by being bolted to an extension base connected to the main frame of the machine. The die block is of cast steel and of a shape to allow flanges of beams and channels to be conveniently worked, and angles may be punched on either leg at one pass. For a great deal of bridge and structural work this will be found a most convenient type of machine and can be furnished in any desired capacity.



THE HILLES & JONES SPECIAL PUNCHING MACHINE.

Government Contract Regulations in Holland.—American firms desiring to tender for Government contracts in Holland should note the following particulars, several of which are highly important. In general it is undesirable to tender by letter, and English experience seems to show that employing Dutch engineers as intermediaries is the best policy for foreign firms to pursue. If a foreigner tenders direct he must give some technical place of domicile, such as his bank, and is also required to obtain as security two well-known householders, who also have to sign the tenders. The Government, and also the municipal authorities, require that some person directly representing the firm making a tender should be a resident of the country, with power to decide all questions that may arise out of the contract, so as to avoid loss of time by correspondence in cases of misunderstandings. The parties tendering have also, if successful, to deposit a certain percentage (fixed in the specification) of the value of the whole contract as guarantee for its satisfactory fulfillment.

Economy Guaranties of High Speed Simple Engines.

At the meeting of the Engine Builders' Association one of the papers read was by E. J. Armstrong of the Ball Engine Company, Erie, Pa., of which the following is an abstract:

The matter of economy does not always receive consideration. The engine that runs smoothly, noiselessly and regularly will have friends and purchasers whether it uses much or little steam. I have no desire to advocate improvement in economy to the detriment or neglect of other qualities which go to make up successful machines, but I believe that many engine builders have but a very imperfect idea of what their own engines are capable of doing. If the subject were more amenable to mathematical treatment the case would be different, but in spite of the marvelous advancement in science at the end of the century the exact formula for the economical performance of the steam engine has yet to be written. In view of the fact that the steam used by an engine often costs each year as much as the engine itself, it would seem as if the customer might consider steam economy as of first importance and price second. Yet even a small difference in price or a personal preference will decide a purchase without raising the question of economy at all. A difference of 10 per cent. in steam consumption between two engines might easily place the more wasteful one in the position of being too expensive, even as a gift; but there is no doubt that there have been and still are even greater differences than this between engines that are sold on equal terms. It is singular that customers who figure so closely on other matters should be so careless and unbusinesslike in this, or that builders should expect to market engines with no economical record and not even a pedigree. This rather anomalous condition of things will soon be brought to an end; for years there has been an increasing tendency among customers to raise the question of steam consumption, and builders of engines must recognize and prepare to meet a demand for definite promise and performance in the matter of economy.

This should be welcomed, not as a hardship but rather as an opportunity. It is necessary to obtain more exact data concerning the performance of automatic engines, and in making efforts to improve the quality of work turned out the first step is a systematic effort toward finding the defects in that work. The first move in reducing cost is to find out what things are costing, and the way to improve the economy of engines is to test them systematically and to learn their deficiencies.

It is not usually practical to test engines of small size after installation; the expense is disproportionate and the difficulties in the way of obtaining accurate results are great. The liability to error and the impossibility of running preliminary tests make it unsafe to make close guaranties to be demonstrated in this way. The proper place to test an engine is on the shop testing floor. With properly arranged apparatus tests can be made in a short time and at little cost.

It is apparently a simple thing to make duty tests with apparatus of this kind, but the matter is really more complicated than it seems. This method of testing engines cannot fail to impress one with the great difference in accuracy possible, compared with the plan of testing after installation, as must be done with very large engines under any circumstances.

The manner in which different tests check up with each other is to some extent proof of their accuracy, and gives confidence in using the data obtained as a basis for future guaranties. (Mr. Armstrong here presented several duty curves, plotted from tests made in the ordinary course of demonstrating economy guaranties.) The majority of the series of tests shown in these diagrams have been checked by engineers representing the purchasers. In other cases reliance has been placed on the builder to see that his guaranties were fulfilled. The rate of water consumption has been plotted without correction for dry steam, for which, however, a proper allowance was made. These results are not at all exceptional, as is proved by the fact that they practically duplicate each other. They show what is really obtainable in regular practice, with fairly tight valves, moderate clearance and other conditions favorable. There are other details which contributed to the result and which have to be learned by practice and can be learned at all only by frequent tests.

The single valve engine is capable of giving results even better than those shown on the diagrams to the extent of 1 or perhaps 1½ pounds per hour. At the same time the results are very much better than the average of high speed work. As the result of these and other tests I have been able to predict very closely the difference in economy which may be expected from a change in steam pressure, from a change in back pressure, from an increase or decrease in speed. It is possible also to speak with considerable accuracy of the difference in economy between a large and a small engine of the same general design, or of the difference in the same engine when carrying a greater or smaller percentage of its load.

In estimating the steam consumption of an engine of a size or under conditions which have not yet been tested, there are two ways of figuring; one is to determine the losses in the engines separately from the steam accounted for by the card. This method, while quite complicated, is the more accurate of the two and is sometimes very valuable in working out a close guaranty. The other plan is simply to learn the general effect of the different conditions which affect economy and to use some previous tests as a basis.

The building up of a better reputation for the automatic engine is well worth the attention of its manufacturers. No guaranty of economy should be given unless its fulfillment by actual trial is provided for. Where there is no certainty that a test will be made there is the temptation to give a lower water rate than would be the case were its fulfillment one of the conditions, especially if accompanied by penalties for failure to meet the terms of contract.

Penalties are usually considered quite onerous by engine builders, but if not provided in the contract the only penalty is the non-acceptance of the engine; and as this is often impracticable because of lack of time, there is a good chance that the guaranty is not worth anything. Definite penalties at least have the effect of protecting those who really make their guaranties in good faith and with a knowledge of what they can do. There is nothing wrong about it from the purchaser's standpoint. A deficiency in economical performance means a direct and continuous loss to him. There is one feature of the situation that is manifestly unfair and calls for remedial action. Better economy costs money. It may not actually cost more to build the high duty engine than a wasteful one, but it costs a good deal more to learn how and to keep up the standard afterward. It costs money to tune an engine up to meet a close guaranty, and testing engines is an expensive business at the best. There should certainly be an addition to the price when guaranties are required. All duty guaranties should provide for their fulfillment on the shop floor test before shipment and should always be considered as an extra, it being optional in all cases with the purchaser to accept the proposal with or without the guaranty. If the guaranty does not mean anything, it should not be made. If it does stand for something, it costs a good deal and is worth to the customer all that he is likely to be asked for it.

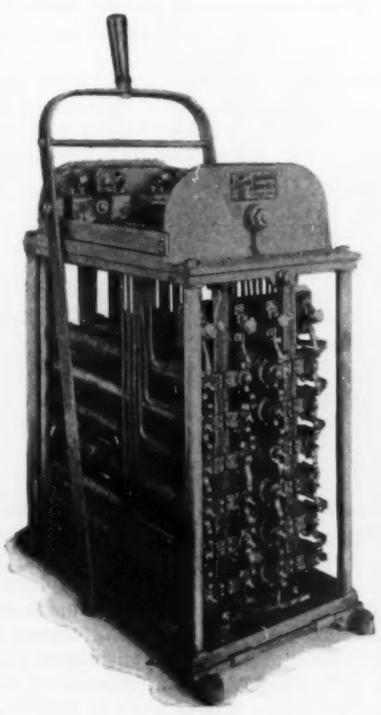
The Monongahela River Consolidated Coal & Coke Company of Pittsburgh, Pa., are about to build a powerful steel towboat, which will be stronger and larger than any now in service on the local rivers. The boat will be about 275 feet long, 53 feet wide and 7 or 8 feet deep in the hold. The machinery will be compound, with 60-inch cylinders and a 12-foot stroke. The boat will be furnished with a battery of ten boilers, the engine driving a wheel 10 feet in diameter. It is expected such a steamer will be able to tow 1,500,000 bushels of coal in a single tow. The cost of the vessel is placed at $150,000.

The Electric Controller & Supply Company's Type E Controller.

The Electric Controller & Supply Company of Cleveland, Ohio, have designed a new style of controller, known as the Type E, and for which they claim a number of distinctive features, making it particularly well suited for crane service and other similar work. The machine is self-contained and all working parts are under cover. All live contacts and parts are under cover, protecting them from injury, dust and consequent short-circuiting. The contact face and arm are under cover, thus avoiding possibility of the eyes of the operator being injured by flashing. At the same time all renewable parts are readily accessible and all repairs can be made without removing machine from the crane cage or in any way disturbing the parts other than those upon which repairs are to be made.

The accompanying cuts show two views of the machine with the coverings removed. The contact face is placed directly under the top cover of machine instead of on the controller's vertical face. Hence, in installing a series of controllers, as in the case of a traveling crane, they can be set snugly side by side, no clearance between them being necessary. Ample resistance is provided for. The manufacturers state they can meet any specifications or requirements as to the resistance of these machines. The resistance is made up in compact, readily renewable sections. The design of the machine insures thorough ventilation of the resistance, thus enabling it to carry a higher current without injury, and also increasing the life and serviceability of the controller. All resistance is contained in the frame of the machine, no separate resistance boxes being required. Hence, with ordinary series-wound motors there are only four connections to be made. The contact arm is provided with powerful blow-out magnets, obviating arcing. Thus the brushes and segments are protected and their life greatly multiplied.

The controller is operated by a single lever, which works smoothly, as is particularly desirable for crane service. A reliable center stop holds the lever firmly in the off position while not in use, thus preventing jarring onto contact. No separate reversing switch is required. The controller can be placed on the floor of the building or of the cage, or can be inverted and anchored or suspended from above, as is sometimes desirable in crane service. There is absolutely no combustible material used in the construction of these machines. The controllers are made in three sizes, with respectively 24, 16 and 12 steps. The 24-step machine is recommended for crane hoists and for other work where a wide range of speed control is required. The 16-step machine is suited for the bridge travel motion, and the 12-step machine for the trolley motion of traveling cranes.



Covers Removed.

Controller Viewed from Above, Top Cover Removed.

THE ELECTRIC CONTROLLER & SUPPLY COMPANY'S TYPE E CONTROLLER.

Railroad Building in 1900.

According to preliminary estimates prepared by the *Railroad Gazette*, more than 4800 miles of new railroad were completed in 1900. The returns cover 286 companies in 43 States and Territories, with 4804.41 miles as the estimated total. These figures are necessarily preliminary, and the completed returns will undoubtedly add to this mileage. The comparison with the returns of 1899 is favorable, during which 284 companies built 4569½ miles, the largest new building since 1891 and 1892. Only about 2000 miles a year was built during the four years from 1894 to 1897. Texas heads the States in new building, with 313 miles. Five other States built more than 200 miles each: Iowa, 279 miles; Minnesota, 255; Pennsylvania, 235; West Virginia, 215, and Louisiana, 203 miles. Alabama built 187 miles; Mississippi, 173; California, 170; Georgia and Oklahoma, each 169; Florida, 157; Wyoming, 153, and South Carolina and Tennessee, each 146 miles.

Among the companies building the Chicago, Burlington & Quincy leads, with 213 miles in four States and Territories. The Chicago, Milwaukee & St. Paul built 173 miles; the Chicago, Rock Island & Pacific, 169 miles; the Northwestern Pacific, 151 miles; the Chicago & Northwestern, 149 miles; the Burlington, Cedar Rapids & Northern, 100 miles; the St. Louis & San Francisco, 111 miles; the Seaboard Air Line, 95 miles; the Illinois Central, 91, and the Gulf & Ship Island, 70 miles. Most of the extended building was by the larger and older companies.

The first train was run through the Great Northern Railroad tunnel in the Cascade Mountains lately. The tunnel is 13,200 feet long, and the depth of the roof at the deepest place is 5300 feet.

Some Electric Furnaces for Laboratory Use.

BY CHARLES L. NORTON.

The following article is from the *Electrical World and Engineer:*

Believing that the experiences of the past three years at the Rogers Laboratory of Physics, Massachusetts Institute of Technology, in the use of several small electric furnaces for laboratory instruction and for research work as well may prove of value to later experimenters, I am encouraged to give some of the details of construction and operation of them, with suggestions concerning their modification for other work.

Early in 1895 the difficulties of maintaining a sufficiently steady rate of heating for purposes of calibration of Le Chatelier pyrometers led us to make up a small muffle of fire clay which might be heated by means of a platinum wire wrapped around it and carrying a current of electricity. By the use of this little muffle we could expose the junction to be calibrated to as gradual a rise in temperature as was desired. We next made several large furnaces in exactly the same way, and found them of service up to about 1150 degrees C., and that their detoriation was not nearly so rapid as that of a gas muffle of the same size. Later we have made use of nickel wire and carbon powder to act as the conductor, whose resistance causes the development of heat. The success of these furnaces for use below 1000 degrees C. is unquestionable, and in careful hands work may be carried on for a long time at 1250 degrees C. without damage to the furnace.

All our earlier furnaces were made out of the ordinary cylindrical porous cups used in batteries. The cups are about 2 inches in diameter and 5 or 6 inches deep. We wound around them spirally about 15 feet of No. 28 B. & S. platinum wire, the spaces being from ¼ to 1-5 inch between wires. The best method of keeping the wires from getting together and becoming short circuited was to coat the cylinder after the wires were wound upon it with a thick paste of some non-conducting and refractory cement. It need not be at all strong—in fact, must not be, but merely to serve to keep the wires from falling together, without preventing a slight expansion and contraction. It is not necessary to cut or mold in the outside of the clay muffle grooves or projections to keep the wires apart.

The main difficulty arises from the slagging of the platinum with the material in which it is imbedded. To wind the wire directly upon the clay is sure to cause slagging at 1100 degrees C. and a lining of asbestos is of very little help, if any. After long hunting we have found that the commercial carbonate of magnesia, such as is mixed with asbestos for use as a steam pipe cover, and some of the purest infusorial earths, from California and Nevada, are the most satisfactory materials in which to bed the platinum wire. The occasional overheating and melting off of the platinum wire is to be expected if the furnace is used by those unfamiliar with its operation, and it is therefore wisest to put it together in such a way that it can be readily rewound and replaced in its insulating packings.

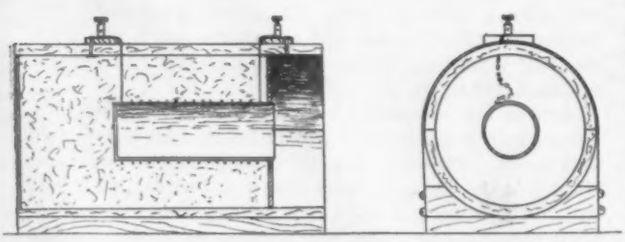


Fig 1.—Electric Furnace.

The detail of the construction used to accomplish this end is shown in the accompanying sketch, Fig 1. The cylinder is first painted over with a coat of carbonate of magnesia mixed with water to about the consistency of cream. The wire should next be annealed and then slightly crinkled by running it between a pair of loosely fitting gears. This renders breakage of the wire by shrinkage less frequent. The wire may very conveniently be wound upon the cylinder in an engine lathe, the cylinder being mounted upon a wooden plug. The next step is to coat the wired cylinder with a second layer of the carbonate of magnesia paste. The lead wires can to advantage be made of three strands of the wire which serves for the heating coil.

The form and amount of the insulating packing which is to be built up around the furnace depends largely upon the particular use to which the furnace is to be put, but in general some such packing as the following will be found satisfactory: Cut out of asbestos mill board a collar, or washer, just large enough to slip over the front end of the cylinder, and let its outside diameter be 5 or 6 inches greater. This collar and cylinder may then be slipped into a section of steam pipe cover of any of the asbestos or magnesia varieties. A standard 8 or 10 inch cover makes a suitable casing for a muffle 2 inches in diameter. The casing should be 6 or 8 inches longer than the muffle, to allow for packing at the back.

The amount of current required to keep these small furnaces at a bright heat is not far from 3 amperes at 220 volts. The cost of running the furnace is, therefore, only a few cents an hour.

A series of attempts at making muffles with a wire of nickel instead of platinum has shown that the slagging of the wire does not occur so readily as with platinum, but owing to its greater fusibility more care is needed in heating at a suitably slow rate.

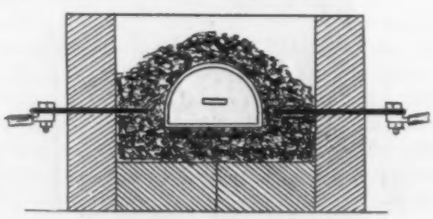


Fig. 2—Electric Carbon Furnace.

The carbon furnaces are of rather a different type and are not nearly so economical. Their range is, however, greater, being limited only by the melting point of the clay in the case of a clay muffle, and if a muffle of carbon be used the range is nearly or quite up to 2000 degrees C. For lecture purposes a carbon furnace can readily be made by packing about a small porous cup, or a regular D muffle, a finely powdered mass of coke, and inserting the end of a carbon plate or rod in the coke on each side of the muffle. On applying a suitable voltage to the carbon rods a current of sufficient strength to heat the whole flows through the carbon. If, instead of a clay cylinder, we use a cylinder made of coke pressed together with some sticky hydrocarbon and then baked, we may carry the temperature well above the melting point of platinum. The coke powder requires constant stirring and the carbon cylinder slowly oxidizes, and crumbles. A sketch of this furnace is given in Fig. 2.

A small reduction furnace for making calcium carbide or carborundum for lectures may be made of a half dozen bricks, a pair of electric light carbons, and a couple of retort stands. In the furnace sketched in Fig. 3 I have readily prepared calcium carbide and carborundum in a few minutes with a current of 50 amperes at 110 volts.

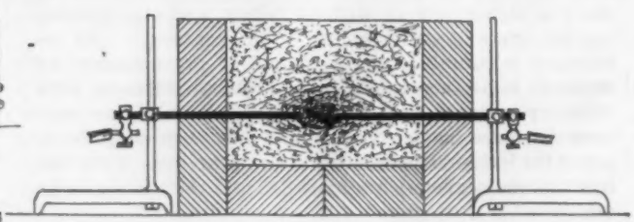


Fig. 3.—Electric Reduction Furnace.

The use of electric heating devices has rendered possible such a complete control of temperature conditions that a very great field of temperature research is ren-

dered available. A second and equally important advantage to be gained in the use of the electrical furnace in the laboratory is its freedom from fumes and dust which might cause injury to the contents of an ordinary combustion heated furnace.

The closeness of regulation of these small electrical muffles is surprising. I have found no trouble in holding them at any desired temperature up to 1000 degrees C., with a precision of between 4 and 5 degrees. The smallest amount readable on the pyrometer scale was 4 degrees, so that with a method of reading smaller changes of temperature, and a more gradual introduction or removal of external resistance to control the current, a still more close regulation might be obtained.

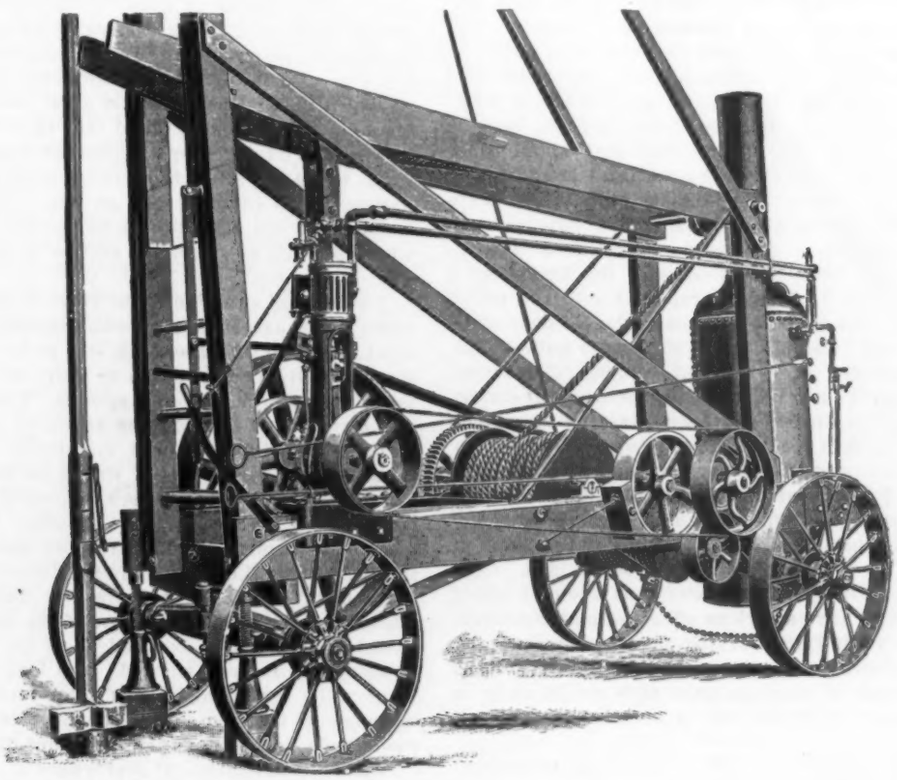
As instances of the work which may be done upon furnaces of this kind, I will mention the theses of three students in mining engineering—Messrs. Badlam, Roberts and Dorey—who graduated last year from the institute. Mr. Badlam, to whose ingenuity much of the detail of this furnace is due, and who was the originator of the crinkling of the wire as a method of preventing the rupture of the wire by shrinkage, made a muffle about 2 feet long for the study of the effects upon steel of heating to different temperatures with a subsequent cooling at any desired rate. I know of no other device in which one might, for instance, heat one bar of steel to 845 degrees C. and allow it to cool to 100 degrees C. in just eight hours, to take the next bar and heat it to 850 degrees C. and then cool it at the same rate, and so on.

Dorey and Roberts used a similar furnace to study the decomposition of zinc sulphate as the temperature rises. Here it was necessary to be certain that the furnace was free from all fumes, and also to make the temperature, while gradually rising, pause, if we desired, at any point long enough to allow of as careful an examination of the contents of the furnace as was needed.

The hardened end of a bit, or chisel, broke off in a bore hole 300 m. deep, put down near Ostroppa, in Upper Silesia, by Zoellner & Co., and this obstruction effectually prevented further boring of the hole, because all the diamond crowns wore away, says the London *Colliery Guardian*. After the most various attempts had failed to remove the piece of steel, the following plan was hit upon by Engineer Degenhardt of Gleiwitz: A soft steel bar, 1.5 m. long and of 70 mm. diameter, was covered by a single winding of india rubber tape, and magnetized by the current of a small dynamo driven by the portable machine employed for the work of boring; and the current was kept constant at about 30 amperes by means of simple resistance coil. The steel bar was let down into the hole unmagnetized, and, when it reached the bottom, the current was switched through the conductor inclosed in the rope for letting down and drawing up. On the first day that this method was employed the piece of steel was drawn up to the surface, so that boring could be resumed.

The Waterloo Well Boring Machine.

The accompanying illustration shows a new well boring machine built by the Kelly, Taneyhill & Woodruff Company, Waterloo, Iowa. The machine is of the walking beam type, the beam being operated by means of a friction clutch. With this clutch the walking beam can be stopped instantly by pushing on a lever. The operator is then enabled to operate one or all other parts just as he chooses. Thus, in hoisting the tools, only the hoisting machinery is used; in operating the bucket, only that part is used; in operating the drill, only that part is used. It is stated that this is the only machine with which the operator can run all parts of it at one time or any one part separately by pushing on a lever and without releasing the pitman or performing any other act. This avoids wasting time in making changes. The machine has only one gear and one pinion on the rope spool. Cog wheels are not used in any other part of the machine. It is built in three sizes.



THE WATERLOO WELL BORING MACHINE.

Application for a charter for the Electro-Pneumatic Company of Connecticut has been made to the General Assembly of that State. The company are said to command $1,000,000 capital, and they propose to inaugurate a service for the transmission of merchandise and other articles through pneumatic tubes. The plan is to run the main tube from New York to Hartford, through Bridgeport, New Haven and Meriden. One of the features of the project would be the practically instantaneous delivery of newspapers from New York to the large cities in Connecticut.

The Chicago Iron Trade in 1900.

BY GEORGE W. COPE, CHICAGO

General Review of Conditions.

The course of the iron trade in 1900 presented a strong contrast to the brilliant record of the year previous. It was marked by long stretches of dullness, by a serious diminution of consumption, by a crop failure in the Northwest, by labor troubles of a most vexatious character and by a sharp decline in prices. The dullness at the opening of the year, which was quite pronounced, was mainly due to two causes. One of these was the universal manner in which all manufacturing consumers had covered their wants for a number of months, thus taking them completely out of the market as buyers. The other was the general protest of the consuming public at the high prices of nearly all commodities. Iron and steel had not been alone in the great advance in prices made in 1899. Other articles in general use had also become much dearer. The cost of buildings and of all other construction had so greatly enhanced that intending investors paused when architects, contractors or engineers presented their estimates, and a comparatively small percentage decided to go ahead regardless of the increased expense when compared with the figures of a twelvemonth before. Farmers reflected over the prices of implements and concluded to make the old ones serve their purposes for another year. Merchants quite unanimously complained of a reduced volume of business, which they ascribed to the very high prices. All classes of buyers and consumers had been educated to a much lower level of prices for a long series of years, and they rebelled at advances of 100 per cent and even more in some lines. A practical demonstration was thus made that prices could be put up so high as to check consumption, although during the exciting times of the boom of 1899 such a view of the situation was derided. The check to consumption which was thus brought about could not fail to have a serious effect on manufacturers of all kinds, from those making primary products up through the entire line to the makers of highly finished goods. A period of ominous quiet thus set in early in the year, which developed into a serious depression a little later.

The intense activity in 1899 had greatly stimulated production in every line, and the high prices had awakened to renewed animation numerous plants that had been regarded as abandoned for years. When business fell off production could not immediately be curtailed, because materials purchased had to be worked up, and in the endeavor to find a market for the product prices were reduced. Although the fall in prices is generally ascribed to the wire manufacturers, who made a startling cut of $20 per ton on wire nails and wire in the latter part of April, values had been sagging in many products from the latter part of the previous autumn. Until the heavy reduction in wire, however, most manufacturers had been endeavoring to make themselves believe that a resumption of buying was to be expected at almost any time in the spring, and they therefore labored to maintain prices as much as possible. The frankness of the wire manufacturers in acknowledging the hopelessness of such a belief put the further maintenance of prices out of the question, and concessions were made all along the line to endeavor to effect sales. But buyers were few because practically everybody had stocked up while prices were advancing, and such stocks had to be worked off first. The check to consumption caused by high prices here came in play as an intensifying element in deepening the depression. Those who had contracted for materials or supplies to cover their requirements for several months, based upon the volume of business done in the flush times of 1899, found that their trade had so diminished that their contracts were ample to meet their wants for a considerably longer period. For this reason those who had great faith in a recovery of activity by the middle of summer, because many of their customers' contracts would then expire, found themselves seriously disappointed.

Meanwhile, another disturbing element projected itself into the situation. The Presidential campaign opened, and, nothwithstanding the general disposition of business interests to look forward to the election without apprehension, a feeling of uncertainty as to the result nevertheless obtruded itself sufficiently to cause a very considerable degree of conservatism in making commitments which might entail losses if the people decided to reverse the policy of the present administration. About this time also the agricultural interests of the Northwest, on which the prosperity of that great section of the country so largely depends, found that their crops of cereals had been so damaged by a prolonged drought that the returns to be expected from those crops would be very meager. This calamity had an immediate effect on the business of the agricultural implement manufacturers, who constitute an important section of Western iron and steel consumers.

The general situation in the West at the close of June, when wages agreements annually terminate in bar mills, sheet mills and tin plate mills, was so far from promising that the mill owners were in no hurry to sign new agreements for another twelve months. The views of the mill owners and the representatives of the workmen as it happened differed quite materially concerning the schedules to govern rates of wages for the ensuing year, and although conferences were frequently held they were fruitless for practically three months. Undoubtedly a basis of settlement would have been agreed upon much sooner if the mill owners had experienced any considerable demand for their products, but during almost the whole of this period the output of the mills which were closed seemed not to be needed, as the trade had previously been so well stocked. The long stoppage of so many mills served to intensify the depression in other branches of the iron trade dependent on them, causing steel works and blast furnaces to shut down.

While the disagreement over wages in the rolling mills was the most important labor controversy in the Western iron trade, other labor troubles affected the consumption of iron and steel to a considerable extent. In a number of localities the building trades were involved in disputes which checked building operations, but the most serious of these was in Chicago. Early in the year the Chicago contractors determined to submit no longer to the dictation of trade unions, more especially the walking delegates, and an organized effort was made to reform the labor situation, one of the principal points aimed at being the removal of the restrictions placed on the amount of work to be turned out in the accepted working day of eight hours. This contention proved more protracted than had been expected, and for almost the entire year the Chicago building trade was virtually paralyzed. Buildings previously begun were completed only under police protection, the contractors encountering great difficulty in securing materials as well as labor. Many thousands of men were idle for the greater part of the year, and numerous branches of business in and out of Chicago suffered severely. The contractors won, but the bitterness engendered by the contest continues and peace does not yet reign unchallenged. Other labor troubles broke out in quite a number of manufacturing establishments, usually based on demands for higher wages. The most important of these were the machinists' strike and the molders' strike, both for a shorter day and higher wages. The machinists' strike, which was precipitated in February, promised to be exceedingly serious. It be-

gan about the same time in Chicago, Cleveland and Columbus, but fortunately for the country the difficulty was soon amicably adjusted by national representatives of both parties, and was not permitted to spread throughout the country. The molders' strike in machine molding shops developed soon after the settlement of the machinists' strike, but it was confined to a few Western cities and did not become general. These labor troubles all had the effect of unsettling business and causing apprehension for the future.

These discouraging influences were providentially offset to a considerable degree by a remarkable wave of prosperity which favored the trans-Missouri region. While the extreme Northwest suffered from drought as never before since its settlement, the Missouri River section was blessed by the most prolific wheat crop it had known, and the agriculturists of a great district, a kingdom in area, enjoyed bounteous returns for their labors, making the third prosperous year in succession. The purchasing power of the people of that section was thus so extended that their local commercial interests felt no depression during the entire year, and the beneficent results of their prosperity overflowed into other localities and helped to relieve the general situation. The Western railroad systems enjoyed a large traffic as a direct consequence of this prosperity and made surprising gains in their earnings over the previous year, which had itself been a period of marked improvement in this respect.

Toward the latter part of July the agricultural implement manufacturers began to make contracts for bars for their approaching manufacturing season. They had deferred contracting until much later in the year than usual, owing to the downward tendency in prices and their own diminished trade in the Northwest. They evidently could not have selected a more favorable time to buy cheap steel bars. The lowest prices not only of the year were made, but they were almost as low as those ruling before the boom of 1899. The steel manufacturers were so eager for this business that they apparently did not consider the prices of raw material. This spurt of buying continued for two weeks or more, during which time it is estimated that more than half of the total bar tonnage annually consumed in Chicago territory was placed under conract. The buying movement thus inaugurated in bars naturally affected favorably other branches of trade, but business was only spasmodic until September, when a sustained demand set in which gathered force as election day approached and business interests generally became more and more confident that the people of this country could be relied on not to decide in favor of trying a new financial policy. The confident feeling was further stimulated by the settlement of labor troubles, the gathering of a magnificent corn crop, and the indications on every side that stocks of manufactured goods had been reduced below normal requirements.

Under these influences the month of October witnessed quite a general awakening of industrial activity. The rolling mills which had been so long idle were flooded with orders and prices began to harden. Furnace companies found their stocks of pig iron diminishing and began to make arrangements for the resumption of production. A feature of business at this time was the placing of numerous contingent orders for future delivery based on the result of the Presidential election, to be canceled if the administration should be defeated. A considerable percentage of manufacturers and merchants, as well as capitalists contemplating investments, could not be convinced in advance that the result of the election was a certainty, and therefore proceeded prudently and conservatively in making commitments. Immediately after the election in November the contingent orders became contracts and in addition a vast amount of business that had been held in abeyance poured in upon manufacturers and the iron trade again became buoyant, with sharp advances in prices. New combinations and organizations of manufacturers were formed, giving an additional stimulus to the upward movement, and quickening the actions of hesitating buyers, who hastened to cover their wants in anticipation of further advances. As a consequence of these combined influences, the month of November was a period of very heavy trade, the magnitude of which approached, if it did not exceed, any of the best months of the boom of 1899. The activity extended well into December, the order books of manufacturers becoming so well filled as to remove all apprehension over work for the winter, and assuring the maintenance of prices until the opening of spring trade.

Range of Prices During the Year.

A study of the fluctuations in Chicago prices is of much interest, in view of the varied influences affecting trade during the year. For this purpose a compilation of monthly averages of weekly quotations on a number of iron and steel products has been made and is herewith presented. In connection with these, comparisons are made with preceding years.

Pig Iron.

The course of prices on some leading grades during the past 11 years is shown in the following table of prices at Chicago, averaged from quotations in our weekly trade report:

Months.	Local coke No. 2.	Lake Superior charcoal.	Ohio strong soft No. 1.	Southern coke No. 2.
January	$23.50	$25.50	$25.50	$21.85
February	23.50	25.50	24.50	21.85
March	23.50	25.50	24.50	21.85
April	23.50	25.50	24.50	21.85
May	22.50	24.50	24.00	21.35
June	20.50	23.00	22.50	20.10
July	18.25	22.00	20.00	17.85
August	16.00	20.00	18.50	15.85
September	15.00	18.50	17.50	15.35
October	14.50	18.00	16.25	14.35
November	14.00	17.00	16.00	14.10
December	14.75	18.25	16.25	14.60
Average for year...	$19.12½	$22.00	$20.75	$18.35
Average for 1899.....	17.65	19.80	19.67	17.75
Average for 1898.....	11.00	11.60	12.00	10.45
Average for 1897.....	10.60	13.00	12.25	10.25
Average for 1896.....	11.70	13.62½	14.50	11.40
Average for 1895.....	11.80	13.75	14.25	11.75
Average for 1894.....	10.60	14.75	13.50	10.75
Average for 1893.....	12.80	16.12½	16.00	12.75
Average for 1892.....	13.90	16.75	16.75	14.00
Average for 1891.....	15.25	17.37½	18.00	15.00
Average for 1890.....	16.75	20.75	20.00	15.25

Finished Iron and Steel.

The following table shows the course of prices for the past 11 years on several kinds of finished iron and steel, averaged from our quotations on mill shipments, Chicago delivery:

Months.	Common bar iron. Cents.	Soft steel bars. Cents.	Angles. Cents.	Smooth machinery steel. Cents.	Open hearth. spring. Cents.
January	2.30	2.35	2.40	2.95	3.60
February	2.30	2.35	2.40	2.95	3.60
March	2.30	2.35	2.40	2.85	3.55
April	2.15	2.20	2.40	2.80	3.50
May	2.05	2.10	2.40	2.45	3.00
June	1.75	1.85	2.15	2.20	2.75
July	1.40	1.40	1.95	2.10	2.60
August	1.30	1.25	1.75	1.85	2.25
September	1.35	1.30	1.55	1.80	2.20
October	1.35	1.30	1.55	1.75	2.15
November	1.40	1.35	1.55	1.75	2.15
December	1.45	1.40	1.55	1.75	2.15
Average for year..	1.75	1.75	2.00	2.25	2.80
Average for 1899....	1.80	1.90	2.00	2.50	2.85
Average for 1898....	1.05	1.10	1.25	1.55	1.61
Average for 1897....	1.11½	1.13	1.19	1.52	1.66½
Average for 1896....	1.30	1.30	1.40	1.62½	1.87½
Average for 1895....	1.25	1.37½	1.50	1.70	1.85
Average for 1894....	1.10	1.25	1.40	1.70	1.85
Average for 1893....	1.47½	1.60	1.82½	2.00	2.05
Average for 1892....	1.62½	1.75	1.97½	2.11	2.09
Average for 1891....	1.70	....	2.17	2.32	2.40
Average for 1890....	1.82	....	2.37½	2.70	2.75

Steel Tank Plates.

The steel plate trade was subject to more severe changes in price than any other branch of the iron and steel business. From January to August the decline was more than 50 per cent. As plates had risen more than any other rolled product, so the decline was greater when the depressing influences of the spring and summer had full play. In November, for the first time in the history of the plate trade, the manufacturers effected a combina-

tion and advanced prices by concerted action. The course of prices on mill shipments, Chicago, was as follows during the past two years, averages being made from weekly quotations:

Months.	1900. Cents.	1899. Cents.	Months.	1900. Cents.	1899. Cents.
January	2.60	1.30	July	1.45	2.90
February	2.45	1.45	August	1.30	2.75
March	2.35	1.80	September	1.25	3.00
April	2.15	2.35	October	1.25	3.15
May	1.90	2.45	November	1.45	2.95
June	1.70	2.85	December	1.55	2.80

The average for 1900 was 1.80 cents, against 2.50 cents in 1899.

Steel Rails.

The rail trade of the year was heavy, the local mills being driven with work for the entire time with the exception of a brief stoppage in October. Prices of heavy sections were maintained at $35 at mill until the latter part of September, when a reduction was made to $26, which price still obtains. The average of monthly quotations for the year was $32.75, as compared with $28.50 in 1899, $19 in 1898, $19 in 1897, $29 in 1896, $25.50 in 1895, $25 in 1894, $29.50 in 1893, $31.17 in 1892, $31 in 1891, and $34.50 in 1890.

A lively demand was also experienced for light sections throughout the year, with considerable business booked for export.

Old Material.

Prices of old material were very seriously affected by the quietness of the iron trade and the great falling off in consumption. The lowest point was reached in midsummer, when the rolling mills were shut down and the demand for scrap was practically *nil*. An improvement occurred in the fall months, but prices rallied only slightly, with the exception of old iron rails, for which the demand for a time exceeded the supply. The course of prices at Chicago on leading varieties in the last 11 years is shown in the following table, averaged from weekly quotations:

Months.	Old iron rails. Gross ton.	No. 1 railroad wrought. Net ton.	No. 1 cut mill scrap. Net ton.	Heavy cast scrap. Net ton.
January	$25.00	$21.00	$10.75	$13.00
February	23.50	20.90	10.25	12.25
March	22.50	19.90	9.85	11.85
April	21.50	19.20	9.85	11.60
May	19.00	16.50	8.70	11.00
June	15.00	12.50	7.35	10.00
July	13.25	10.75	6.70	9.00
August	12.50	10.25	6.25	9.00
September	12.75	10.75	6.45	9.15
October	15.50	12.25	6.70	11.00
November	16.75	13.40	6.70	11.60
December	17.50	14.60	6.70	11.60
Average for year	$17.90	$15.00	$8.00	$11.00
Average for 1899	21.00	17.25	10.15	12.40
Average for 1898	12.37½	11.25	6.62½	8.15
Average for 1897	11.67	10.60	6.44	7.25
Average for 1896	13.50	11.20	7.00	8.48
Average for 1895	14.12½	11.08	7.67	8.37½
Average for 1894	10.83	8.80	6.85	7.50
Average for 1893	16.25	12.75	9.25	10.00
Average for 1892	19.10	15.75	11.17	11.66
Average for 1891	22.75	18.35	13.75	12.25
Average for 1890	25.00	19.75	15.62	13.37½

Old car wheels, which had ranged from $12 to $21 per gross ton in 1899, advanced to $24 in January, 1900, and maintained that price until June, when they receded to $23, continuing to droop during the month until $18 was quoted at its close. This price prevailed through July, but in August a drop was made to $15, rising in the latter part of September to $16, reaching $17 in October, but falling to $15.50 before the close of the month. In November prices ranged from $15 to $16, standing at $15.50 in December. The average for the year was $19.75, against $16.50 in 1899.

Heavy melting steel scrap advanced in 1899 from $7.75 per gross ton in January to $18.50 in November, receding to $18 in December. Opening at $18 in January, 1900, it fell to $17.50 before the close of the month, and to $17 in February, but stood at that price through March and April, falling from $16 to $13 in May, to $11 in June, and to $9 in July, not rising above this figure in August. An advance to $10 occurred in September, and this rate was maintained in October. November ranged from $9.50 to $10, an improvement to $11 occurring in December. The average for the year was $12.85, against $13.25 in 1899.

The progress of time has wrought some changes in the trade, whereby certain prices which once had a regular place in this annual review are either no longer available or have lost their special significance, so that they have been dropped. Sales of steel billets, for instance, are only made at wide intervals, as on the one hand the Illinois Steel Company have increased their finishing capacity to practically work up all the billets they make while on the other hand the purchasers of billets in Chicago territory are now very few in number, as a result of consolidations. More wire rods are rolled in Chicago and vicinity than in previous years, but transacttions in rods are also far apart because buyers are very few in number, also as a result of consolidations. Chicago was formerly an independent market for light sheets, having not only a local mill but being also a favorite fighting ground for sheet manufacturers in other parts of the country. This condition has been totally changed by the consolidation of the sheet mills, and Chicago prices are now merely Pittsburgh prices with freight added. Yet the consumption of sheets is steadily increasing.

The Expansion of Trade.

The great revival in business of the past three years has had a decidedly stimulating effect on the Chicago iron trade, which is now being manifested by expanding capacity for both the production and consumption of iron and steel.

The Illinois Steel Company have enlarged the finishing departments of their various plants, much of which was done in 1900, until they now have a very slight surplus of billets to be marketed in that form. Their steel converting capacity having outgrown their pig iron capacity, they have begun the erection at South Chicago of two large blast furnaces, to be ready for operation some time this year, each easily capable of making 500 tons a day.

The announcement is made that the huge sum of $10,000,000 is to be expended in the coming year or two in the erection of a structural steel plant at South Chicago and in other additions to existing works. The structural plant has been contemplated for some time, a tract of 140 acres having been purchased for the purpose several years since.

The Iroquois Iron Company have also been impressed by the necessity of a greater supply of foundry pig iron to meet the growing requirements of the Chicago trade and are building a 300-ton furnace, which is to be ready for operation about the opening of navigation.

The Emlyn Iron Works built a rolling mill at East Chicago, Ind., having a daily capacity of 150 tons, and put it in operation early in the summer.

The Grand Crossing Tack Company, Grand Crossing, Chicago, built a rod mill in 1899, but it was virtually 1900 when the mill got into good running order. It is of the Morgan continuous type and has a daily capacity of 150 tons.

The Dillon-Griswold Wire Company, Sterling, Ill., also began to build a 150-ton rod mill in 1899, which began to roll rods regularly in the summer of 1900.

The Republic Iron & Steel Company enlarged and improved their rolling mill at East Chicago, Ind., greatly increasing its capacity and making it one of the most important of their numerous plants.

The Sargent Company put their new Tropenas steel casting plant in operation at Chicago Heights last March. It contains three Tropenas converters of 2 tons each. They also erected a new iron foundry at the same place, melting 30 tons daily. The company continue to operate their open hearth steel casting plant and iron foundry in Chicago. Their total daily capacity in both works is 90 tons of steel and 60 tons of iron.

Fraser & Chalmers have arranged to install a Tropenas steel plant for the manufacture of steel castings. Their works now rank among the leading manufacturing establishments of Chicago, but will be made still more important.

Prominent among the great Chicago consumers of

iron and steel are the agricultural implement factories, whose products are shipped not only to all parts of this continent, but also to Europe, Asia and Africa. All of them have within the year greatly increased their capacity.

The Deering Harvester Company have made extensive additions to their plant, which will enable them to increase their consumption of iron and steel 40 to 50 per cent., if the condition of the coming season's crops should warrant such an enlargement of their business. Their consumption of all kinds of bar steel and iron the past year was about 65,000 tons, and of pig iron about 55,000 tons. The improvements in buildings and machinery now being completed in readiness for use in the approaching season's business have involved an expenditure of about $250,000. Among these improvements are a boiler and engine house for their central station, a large combination manufacturing building and warehouse, and an extensive addition to their wood working department. In the boiler house they have installed three additional 650 horse-power Edgmoor boilers, the largest of their type.

The McCormick Harvesting Machine Company have erected five additional buildings, covering a space of over 22 acres. Five new engines, with an aggregate horse-power of 5400, have been installed. These, with smaller improvements, have caused an increase in capacity of 25 per cent. The company's consumption of iron and steel in 1900 was 25 per cent. greater than that of 1899. No more improvements are contemplated at present.

The Plano Mfg. Company, at 120th and Peoria streets, Chicago, have erected some additional buildings the past year and have also greatly improved their equipment, which will enable them to again increase their output considerably and will correspondingly increase their consumption of iron and steel. Among their improvements were the installation of a 350 horse-power Nordberg engine, a large Hall air compressor and the addition of numerous tools and improved appliances in their blacksmith and machine shops, foundry and wood working departments. The business of the past year showed a healthy increase over the preceding year.

The malleable foundry trade of Chicago grew to much larger proportions in 1900, largely due to the starting of new enterprises, but partly to the increased output of old works. Some of the largest concerns in this line did 50 per cent. more business in the past year than in the preceding one, notwithstanding the competition of new foundries.

The new malleable foundries in Chicago comprise those of the Chicago Malleable Castings Company, at West Pullman; Forster, Waterbury & Co., at Franklin Park, and the Stockham Mfg. Company, at Forty-sixth street and Grand avenue, with an aggregate capacity of about 100 tons per day.

The gray iron foundries also greatly increased their capacity. The Illinois Malleable Iron Compdany built another gray iron foundry as an addition to their Diversey Boulevard plant, increasing their melting capacity 25 per cent. They also erected a large machine shop.

The W. A. Jones Foundry & Machine Company established a new foundry and machine shop at North avenue and Noble street, more than doubling their former facilities.

The Latrobe Steel & Coupler Company, at Melrose Park, greatly enlarged and improved their steel casting plant.

The Maywood Foundry & Machine Company built an entirely new foundry and machine shop at Melrose Park.

Some of the smaller foundries in Chicago were obliged to increase their shop space and equipment to enable them to satisfy the demands of their customers, notably among these being Cleveland & Barr, on Erie street.

Outside of the city, but within Chicago territory, new malleable foundries were built by the Union Malleable Iron Company, at East Moline, Ill.; the South Bend Malleable Iron Company, at South Bend, Ind., and the Grand Rapids Malleable Iron Company, at Grand Rapids, Mich.

New gray iron foundries were built by the Kewanee Boiler Company, at Kewanee, Ill.; the American Foundry Company, at Rockford, Ill.; the Racine Steel & Iron Company, at Racine, Wis., and the Christensen Engineering Company, the Milwaukee Stove & Foundry Company and Clinton Burnham, at Milwaukee, Wis.

The Falk Company built an open hearth steel castings plant at Milwaukee.

The capacity of their gray iron foundries was largely increased by the National Sewing Machine Company at Belvidere, Ill.; the Chicago Hardware Foundry Company at North Chicago, Ill.; the Love Mfg. Company, and the Union Foundry Company at Rockford, Ill.; the Racine Malleable & Wrought Iron Company at Racine, Wis., and the Estate of P. D. Beckwith, at Dowagiac, Mich.

A marked tendency has been observed among manufacturers of iron products who have hitherto been purchasers of castings to add foundries to their plants and begin to make their own castings. For this reason quite a number of foundries may have been built in the Chicago district which have escaped notice.

Prospects for 1901.

The outlook is much more encouraging than that of the beginning of 1900. Prices are now on a much more reasonable plane, and consumers are showing their appreciation of the fact by their free purchases. Plans for new enterprises involving the consumption of much iron and steel are being pushed to completion. Stocks of all kinds of materials are small, being rather below normal than above it. The incubus of a Presidential campaign has been removed and business interests are assured of no adverse governmental interference in their affairs for at least four years. As the country generally has been blessed with good crops, agriculturalists feel prosperous, manufactured products are in active demand, and workingmen are well employed at good wages, railroads are earning more money than a year ago, and more corporations are paying dividends than ever before, it is believed that the first half of 1900 will be a period of good business and remunerative prices. The outcome of the last half of the year will depend upon the crops in this country and abroad.

Ninety-two Years Old.

The oldest tin plate and metal house in the United States and one of the oldest business houses in the country—N. & G. Taylor Company of Philadelphia—present in this week's issue of *The Metal Worker* their ninety-second annual greeting. The fact that the advanced age of the firm finds them more vigorous and progressive than ever deserves more than passing notice. N. & G. Taylor Company were among the first concerns to undertake the manufacture of tin and terne plates in the United States. Their tinning plant in Philadelphia was erected in 1892 and is among the largest establishments of its kind in the world. At the present time they have under lease a fine five-mill tin plate plant at Cumberland, Md., where all their black plates are manufactured. So large has been the demand for the company's special brands of roofing and bright tin, which have achieved an enviable reputation throughout the country, that they propose enlarging and improving both the Cumberland and Philadelphia works during the coming year. Plans are being made for the erection of two large buildings in their yards, extra sidings will be put in and other facilities introduced for the prompt execution of orders.

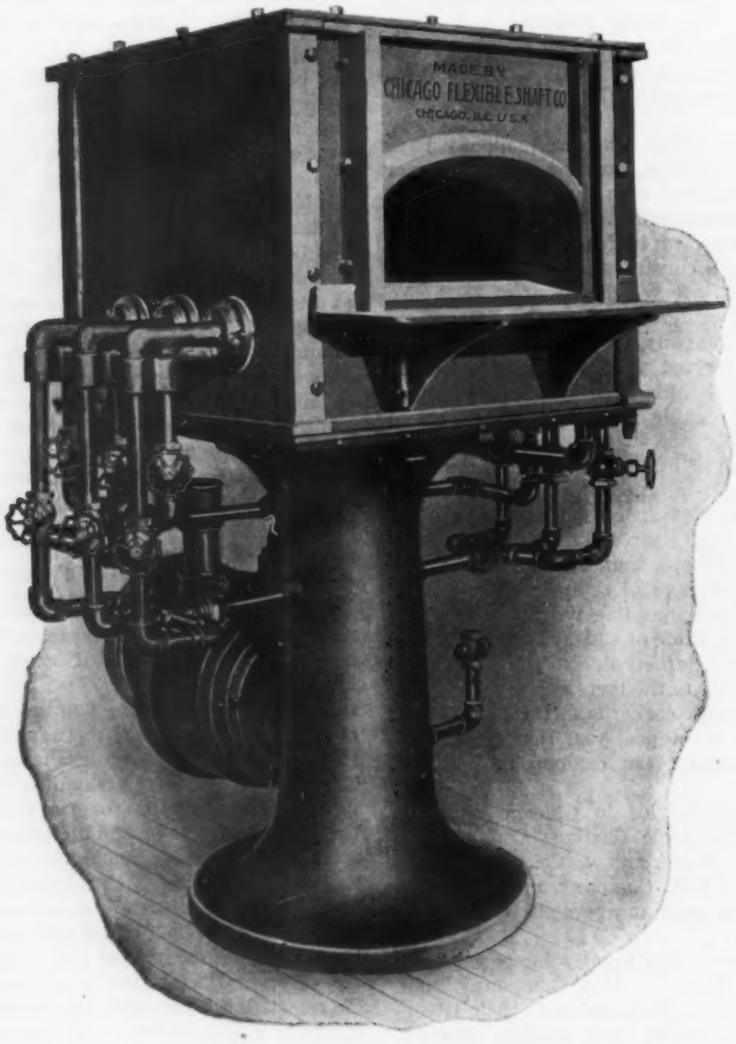
The Output of Locomotives and Cars in 1900.—Figures compiled by the *Railroad Gazette* show that the output of locomotives and cars in 1900 was greater than in any previous year. All the contracting locomotive works built 3153 locomotives. This is 680, or 27.5 per cent., more than in 1899, when the record was also broken. Of the total output last year, 505, or about 16 per cent., was exported. In 1899, 514 locomotives were exported. The various car building works in the United States built 124,106 cars during the year, as against 123,893 in 1899. Of this output 113,070 were freight, 1515 passenger and 6091 street cars for use in this country, and 2561 freight, 121 passenger and 748 street cars for export. The extension of the steel car industry is shown by the fact that of the total freight cars turned out in 1900 14,464 were all steel; 447 of these were for export. In 1899 the total was 10,500, while in 1898 but 2700 steel cars were built.

The Stewart Gas Blast Furnace.

The merits of gas heating furnaces for the treatment of fine steel, in the manufacture of tools and other small articles, are steadily being more widely recognized. Their use, moreover, is being increased by the improvements which are constantly being made by the furnace manufacturers. These improvements consist, first, in devising means of more perfectly controlling the temperature, so that any desired degree of heat may be obtained and changed at pleasure; and, second, in combining with the furnace necessary auxiliary apparatus to make the arrangement as compact as possible.

There are many gas furnaces on the market and new patterns are being constantly introduced. The one illustrated herewith is the No. 3 oven and muffle furnace, manufactured by the Chicago Flexible Shaft Company, 158 Huron street, Chicago. It will burn illuminating gas, water gas, natural gas or gasoline gas, and with none of these will it make any smoke, soot or odor. This particular furnace is equipped with independent burners, making it possible to regulate the heat so that a uniform temperature can be maintained on all parts of the muffle, even though the doors be left open. It is especially adapted for heating large pieces of steel to be annealed or hardened, such as large dies, punches, knives, tools, &c. The furnace combines the combustion chamber, air reservoir and rotary pressure blower on one base. No piping of air is necessary. The air reservoir is sufficiently large so that an ample supply is always on hand. The blower when belted to power will deliver air to the furnace at a constant pressure of one pound to the square inch, at which pressure the heat is uniform and just what is required for fine tools, dies, &c.

The furnace can be set up in any convenient place, as it requires no chimney. The flame is projected from the burners into the chamber encircling the muffle. The lining is of such shape that a rotary motion is imparted to the flame, causing it to distribute itself evenly over all the inclosed space, the products of combustion being drawn off by two small openings at the top of the chamber. The degree of heat is under complete control. Overheating can be entirely avoided, and difficult pieces can be hardened without danger of cracking by reason of the uniform heat throughout.



THE STEWART GAS BLAST FURNACE.

Assemblyman Fallon of Hudson County, N. J., has prepared for introduction in the New Jersey State Legislature a bill aimed against "combinations for the creation of a monopoly or the unlawful restraint of trade and the prevention of competition in any necessary of life." The bill provides that any person or persons, partnership, company or corporation doing business within the State who shall combine for the creation of a monopoly or the unlawful restraint of trade, or for the prevention of competition, in any necessary of life, shall be guilty of a high misdemeanor, and upon conviction shall be punished by a fine of not less than $1000 nor more than $10,000 for each offense, or be imprisoned for not less than one year nor more than seven years, or both.

Secretary J. B. Gibson of the Commercial Club of Birmingham, Ala., has secured statements of the mineral production of Alabama for 1900, which estimate the production of coal, coke, ore and pig iron as follows: Coal, 9,000,000 tons; coke, 2,150,000 tons; iron ore, 2,000,000 tons; pig iron production, 1,192,000 tons.

A National Standardizing Bureau.

WASHINGTON, D. C., December 31, 1900.—The subcommittee of the Senate Committee on Commerce, to which the bill providing for the organization of a National Standardizing Bureau was recently referred, gave an extended hearing on the 28th inst. to a number of prominent Government officials, scientists and others interested in the passage of the measure. Among those heard by the subcommittee were Secretary Gage of the Treasury Department; Prof. O. H. Tittmann, superintendent of the Coast and Geodetic Survey; Prof. S. W. Stratton, inspector of weights and measures of the Survey; President Carl Hering of the American Institute of Electrical Engineers; Prof. Henry A. Rowland of Johns Hopkins University, and John W. Lieb, Jr., general manager of the Edison Electric Illuminating Company. Letters were also laid before the committee from Dr. C. B. Dudley, chief chemist of the Pennsylvania Railroad Company, and Albert Ladd Colby, metallurgical engineer of the Bethlehem Iron Company. Senator Nelson, chairman of the subcommittee, and Senator Turner presided over the hearings.

Secretary Gage as a Witness.

Secretary Gage was the first witness, his statement dealing with the general features of the proposed bureau and its great desirability, not only from a technical standpoint, but in all the relations of the Government and public. He said in part:

"In the standardizing of weights and measures and in the testing of appartus of every kind other countries are far ahead of us; in fact, it may be said there is no comparison at all between us. We are dependent very largely on Germany, to some extent on France, and to a limited degree on England for all measurements which we are obliged to resort to in testing and comparing when we enter into competitive work against them. The application of this Standardizing Bureau, if established, will be very wide—it touches manufacturing, the arts, commerce, all scientific work, and will be most important in the general work of education. We have come to a period where guess work will not do, and the old, familiar phrase 'pretty nearly' does not count. Exactness, absolute adherence to standards and perfect uniformity are essential. This bill has the support of the most important men in every line of commercial and manufacturing activity in America. It is also highly commended by scientific bodies, and by the heads of schools and universities throughout the country, and in this connection I want to say that these commendations have not been evoked in the way in which such testimonials are often drawn out for the purpose of influencing committees. The general idea has become disseminated throughout the country and has aroused widespread interest.

"There is another side to this question that occurs to my mind—what I might call the moral aspect of the matter. The recognition by the Government of an absolute standard to which fidelity in all the relations of life is required is a most excellent thing. We are living in a period of looseness, due perhaps to our rapid development. We lack the proper comprehension of the binding sanction of accuracy in every phase of life. Now, the establishment of a bureau like this where the Government is the custodian and the originator of these standards of weights and measures will have its effect upon the minds and characters of the rising generation, and this to my mind has a value far above the mere physical considerations although those are of the greatest importance. Nothing can dignify this Government more than for it to take the necessary steps for the establishment of absolutely correct scientific standards, and then to adopt such legislation as will hold our people to faithfully regard and absolutely meet the requirements of law in an adhesion to all true standards."

Professor Stratton then took up the bill at the suggestion of Chairman Nelson, and analyzel the provisions concerning the force of experts and assistants necessary to carry on the work, and stated that until the bureau was in active running order the entire *personnel* would not be required. Senator Nelson said he regarded this as highly important, as a reduction in the amount necessary to start the bureau would aid materially in securing the passage of the bill at this time.

Professor Tittmann then addressed the committee, briefly emphasizing the importance of providing the proposed bureau with an adequate building and complete equipment of apparatus. He stated that it would be impossible to secure quarters in any Government building now in existence and added that a valuable and much used set of balances in the present office of Weights and Measures was located in the coal vault for the reason that no other place could be found for it where the temperature was sufficiently even to give fairly accurate results.

Prof. Henry A. Rowland, now occupying the chair of physics in John Hopkins University, emphasized the importance of the adoption of a series of electrical standards to measure resistance, current, voltage, candle-power, &c. No such standards could be had in the United States, and the laboratory at Johns Hopkins was recently obliged to send abroad to secure accurately standardized thermometers. The National Standardizing Bureau would be able to settle many controversies and would be of enormous value to the general public as well as to corporations furnishing electric current for heat, light and power purposes.

The American Institute of Electrical Engineers.

Mr. Hering, who was the next speaker, said that the American Institute of Electrical Engineers had given its hearty indorsement to the movement to secure the establishment of the proposed bureau because its members were keenly alive to the necessity of such an institution. "Imagine," said he, "the shipbuilding industry, or the bridge builders or armor manufacturers attempting to work without any standard for the pound, ton, inch, foot, &c., and you can secure a faint idea of the present situation in the electrical industry. We have no way of determining many important standards, and those we have we have brought from Germany because of our inability to get them in this country. Only recently the Brooklyn Navy Yard was obliged to send a lot of electric lamps that it desired tested to the Reichsanstalt, and these lamps are now being used as secondary standards. This is certainly humiliating to have to send abroad to secure such a simple standard, but it could not be produced in this country. The electric industry now represents more than $2,000,000,000, but it has no recognized standard in the United States. This is not because we cannot make instruments of the utmost accuracy, but simply because we have no central institution that can establish and maintain standards. When I was recently in Berlin I found that American instruments for measuring electric currents and American made cells for recording electric pressure were in use in the Reichsanstalt, but the calibration had been corrected according to the German official standards. This was a great compliment to the excellence of our instruments, but it also showed that we are without standards for correct calibration.

"In my opinion the money to be used in establishing this bureau will not be expended in the ordinary sense, but will be invested; for it is certain to bring a large return. Already the Reichsanstalt in Germany has brought a very large amount of trade to German manufacturers. They turn out their instruments, and after having them officially tested and stamped they can sell them the world over. Without the stamps they would not sell at all. It is certainly a remarkable fact that instrument makers in the United States feel obliged to advertise that their instruments have been calibrated abroad in order to sell them."

Mr. Lieb made a very full statement to the committee concerning the necessity of standards of electrical measurement, especially because of the general tendency in State and municipal affairs to place corporations furnishing electricity for any purpose under some sort of supervision. Controversies were constantly arising for which no method of settlement could be devised. The various Edison companies throughout the country had undertaken to provide standards for lamps, but of course these were more or less arbitrary, and the resolutions in which the standards were specified stated that they were selected "only until standards could be supplied by prop-

erly constituted authorities." The London Parliamentary candle and the ameyl acetate lamp were the present standards, but with these facilities a tolerance of 2-10 candle power was allowed in testing 16-candle power lamps. Dynamos and electrical machinery was now produced of great accuracy, and with an efficiency of 97 or 98 per cent., but the more nearly perfect accuracy was approached the greater was the necessity for a series of special standards.

Dr. Dudley's Letter.

The following letter from Dr. C. B. Dudley, chemist of the Pennsylvania Railroad Company, was presented:

"I am much interested in the scheme for the establishment of a National Standards Bureau, and do not think too much can be said in favor of the scheme. When it is considered that the accuracy of almost every analysis that is made in connection, either with manufacturing establishments or with great corporations like the Pennsylvania Railroad Company, depends on the accuracy of the apparatus which is used, the importance of the matter will be understood. It is not too much to say that the value of millions of dollars' worth of property, notably iron and steel and other materials, is affected each month of the accuracy of the analyses which are made by the chemists connected with the various establishments either making or using these materials. A single illustration will make this matter clear:

"The railroad company receives a shipment of material which is bought on definite specifications. An analysis is made by the railroad company's chemist which shows that the material is not in accordance with the specifications and the material is rejected, causing loss to the producer. On the other hand, the chemist of the producer either has already made an analysis before the shipment was sent or after it is rejected makes an analysis, and according to his analysis the material does meet the specifications. This clearly brings the two chemists in conflict. After study and investigation, perhaps covering some weeks, it is found that the discrepancy between the two is due to the standard apparatus which they use, and yet both have purchased their apparatus from the best makers, as is supposed; but having no means of submitting their apparatus before use to a standards bureau, they have had to use it either without checking or by checking it as best they could with the appliances at hand.

"You are doubtless quite well aware that where it is essential to have standard apparatus at the present time we are compelled to send abroad for it. There is no reason in the world why this work cannot equally well be done in this country, and I am sure I voice the sentiments of every one who is at all conversant with the facts in the case, and especially those who, like myself, have had endless disputes and conflicts during the years which have passed, some of which would have been avoided if we had had in this country a means of having the apparatus which we use in this country standardized.

"The importance of this bureau in scientific investigations I leave to others, confining myself to the actual practical daily use of apparatus in commercial work. I have been connected with the Pennsylvania Railroad Company, I may say, for nearly 25 years, and the value of material alone which has been examined in our laboratory during that time can safely be said to be not less than $50,000,000."

Albert Ladd Colby's Testimony.

A communication from Albert Ladd Colby of the Bethlehem Iron Company was then read, as follows:

"Your committee will hear many able arguments from scientists urging the adoption of this bill. While I could, if present, heartily indorse their statements because of my technical education, and active connection with the various scientific societies who have passed resolutions favoring this bill, I intended to address you as to the practical value of this measure to large manufacturing concerns of this country, basing my statements on the practical experience gained during my 14 years' connection with the Bethlehem Iron Company.

"The only criticism I make of this bill is that the appropriation is not sufficient to employ a force large enough to meet the demands which will be made by the manufacturing industries of this country for the standardization of apparatus for they will only too gladly pay whatever fee is demanded. Perhaps, however, the amount appropriated may prove sufficient for a start in proving the practical value resulting from the United States Government following the example of the principal foreign governments in establishing a National Standardizing Bureau."

The Coast and Geodetic Survey.

On behalf of the Coast and Geodetic Survey an elaborate memorandum was filed, from which the following brief abstract concerning the relations of the proposed bureau to the iron and steel trade is taken:

"High temperatures are measured by various forms of pyrometers. In some the heat produces a change in the length of a wire or metal bar; others use a thermo-electric junction; but these instruments are entirely useless unless they have been graduated by comparison with the standard hydrogen thermometer.

"When it is considered that a large number of commercial processes, such as the hardening and tempering of steel, annealing, distilling, enameling, baking and others too numerous to mention, depend for their successful operation upon the temperature employed, and that a means of measuring this temperature often prevents enormous losses, the value of a standard hydrogen thermometer, readily accessible, will be easily understood.

"An illustration of the value of a correct pyrometer is found in the following news item recently published:

"'The long anticipated operation of shrinking a jacket on the great 16-inch gun at the Watervliet Arsenal was attempted yesterday and did not result successfully. Another effort will be made in about ten days. The work was supervised by Master Mechanic Christiansen, and the greatest care was given every detail of the operation. The pit in which the jacket was heated is 60 feet deep, and the extreme temperature which is necessary is obtained by the use of oil. Coal was formerly used. To-day was the first time that oil has ever been used for a shrinkage operation. The temperature required is between 800 and 900 degrees. This must be determined to a nicety, and while the monster jacket was being heated measurements of the diameter of the jacket's interior were frequently taken. When the jacket was within a foot of the shoulder at the bottom it came to a sudden stop, and immediately it was realized that the attempt to shrink the jacket had ended in failure. The jacket was within 6 inches of the bottom when it stopped, and it was seen that there was a slight deviation from the required dimensions. The difference in space between the interior of the jacket and the outer circle of the tube must not be more than 1-600 inch. The quick recognition of the failure of the attempt saved the Government about $125,000, for had the jacket been allowed to cool the contraction would have ruined the piece.' The difficulty met with in this instance was undoubtedly the result of inaccurate or insufficient means of measuring temperature. Had the jacket stuck the loss would have been $125,000.

"The extended and important use of pressure gauges in all branches of steam engineering, compressed air plants, hydraulic presses of all sorts, vacuum pans and many other instances is well understood. It frequently happens that many lives and much valuable property depend upon the reading of these gauges. They are tested and compared with a column of mercury many feet in hight. This column of mercury can only be set up in the laboratory, and it is absolutely essential that there should be one of these standard pressure gauges for the comparison of the pressure gauges used in manufacturing and commerce.

"The power of a steam engine, its working condition and efficiency are determined by means of an instrument known as an indicator, the reading of which depends upon the compression of a spring. The compression of this spring for a given weight must be accurately known in order that the record of the instrument may be properly interpreted. The graduation and testing of these

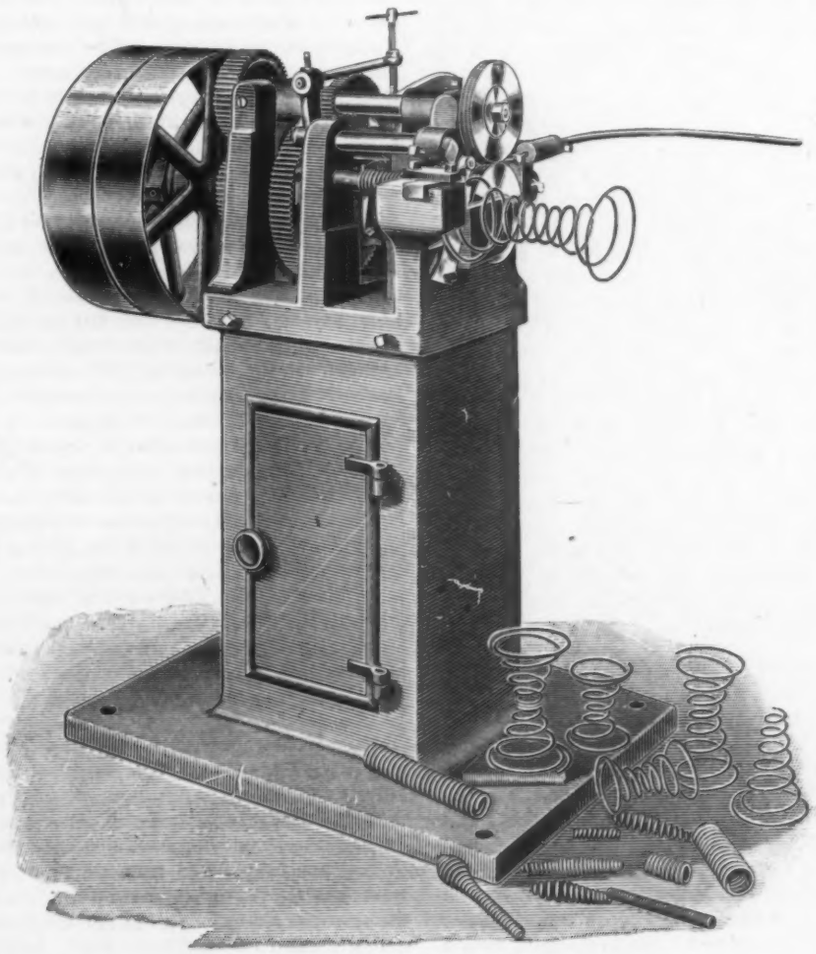
springs serve as an important and practical illustration of the fact that in almost every measuring or recording instrument there is some vital part which must be compared with the original standard by an expert and impartial authority."

Upon the adjournment of the hearing Senator Nelson stated that he would be glad to receive during the next fortnight any statement that any interested person might care to send to the committee and which might be addressed to him as chairman of the sub-committee. He added that he was much impressed with the importance of the bill and would do all in his power to secure its passage. W. L. C.

The Hoefer Automatic Spring Coiler.

The machine here illustrated can be arranged to coil a large variety of different sizes and shapes of springs, specimens of some of which are shown in the cut. This coiler is so designed that the diameter of the springs and their length can, within its limits, be adjusted without the change of gears or cams. One of its novel features is that when manufacturing furniture springs the small diameter of the spring can be increased and the large diameter decreased, and *vice versa*. The lead or spread is also adjustable, so that in the body of the spring a uniform spread can be obtained, and if desired the end or last coil can be made without a spread or without a lead, so that when the spring is set on the end it will stand perfectly perpendicular. The spread as well as the diameter can also be arranged to any desired distance within its limit without the change of gears or cams.

The machine as shown is specially fitted for furniture or upholstering springs, and is capable by the change of one cam to make either single or double cone springs. It can also be arranged to make a close wound center spring, such as is shown by the spring nearest to the column. When the machine is fitted for straight springs for machine or other purposes the cut off can be dispensed with and a continuous coil of 50 to 100 feet long can be run out of any diameter from ½ inch up to 3 or 4 inches or more, and of any spread desired. After such a length has been run out the machine is simply stopped and the spring is cut off by hand, from which length any desired length can be then cut. When fitted for poker or stove lifter or other similar handles the machine is supplied with an automatic cutter and the spring is cut into any desired length. When the springs are to be cut off the machines are capable of running out springs using wire from 2½ to 9 feet in length. The manufacturers of this coiler are the Hoefer Mfg. Company, Freeport, Ill.



THE HOEFER AUTOMATIC SPRING COILER

Freight Traffic of Lake Superior.—According to advices from Duluth, Minn., the freight traffic of Lake Superior for the year 1900 amounted to 25,643,073 tons, an increase over the preceding year of 2 per cent. On the other hand, the number of ships that carried the freight was 19,452, a decrease of 4 per cent., showing the increase in the average capacity of the freight ships of the lake. The passenger traffic increased 19 per cent. Of the commodities carried into and out of Lake Superior the following formed the most important items:

		Per cent. decrease.
Iron ore, net tons	16,443,568	*7
Anthracite coal, tons	515,515	39
Bituminous coal, tons	3,971,462	*28
Flour, barrels	6,760,688	5
Wheat, bushels	40,489,302	31
Other grain, bushels	16,174,359	46
Copper, tons	131,066	*7
Lumber, feet	909,651,000	12

* Increase.

The American and Canadian canals were open the same term, 238 days, and the American canals carried about 92 per cent. of the freight. The period of open navigation was 242 days.

The Pittsburgh Iron Trade in 1900.

BY ROBERT W. WALKER, PITTSBURGH.

General Features.

The year just closing will not show as large profits or perhaps as large a volume of tonnage as did 1899, but on the whole it has been a satisfactory year, and the producer who has a well equipped plant that can turn out material at low cost should find a comfortable balance on the right side of the ledger. There were not during 1900 the meteoric rises in prices of material that we had in 1899, but on the contrary, there were heavy declines from the excessively high figures on everything, reached in the boom year of 1899. This boom, with its unparalleled rise in prices, had pretty well spent its force in October and November, 1899, and while prices were held up in the first two or three months of 1900, it was largely by artificial means, and there was little actual business done in the first quarter of this year, while producers were trying in every way to hold up a market that was topheavy and that refused to be held. We entered 1900 with Bessemer pig at $24, Valley, billets about $35, plates 2.25 cents, beams and channels 2.25 cents, steel bars 2.25 cents and other material in proportion. With these abnormally high prices, there was no incentive for consumers to buy except for actual wants, and the result was that business for the first half of the year was limited in tonnage. Had it not been for the orders carried over by some of the mills from 1899 work would have been very scarce. This applies particularly to rails, a good deal of tonnage being taken over into 1900 that the mills could not get out in 1899. When the remarkable decline in prices that took place in 1900 is considered, together with the labor troubles and other adverse conditions, the volume of business done and the earnings of the mills are, or ought to be, satisfactory to the manufacturers.

Labor Troubles.

The year 1899 was practically free from labor troubles of any kind, but this was not the case in 1900. For two months or more in the summer the bar, tin plate and sheet mills were idle, while efforts were being made to arrange scales with the Amalgamated Association that would be satisfactory to the manufacturers and workmen. The very high prices reached in 1899 had carried wages up to a high point, particularly labor paid on a sliding scale basis, and when prices of iron and steel declined so fast, in some cases more than 100 per cent., and attempts were made by the employers to get wages down to a reasonable basis, the men refused to accept, and a shut down occurred that kept union mills idle for more than two months. Many wage conferences were held in July and August, and after concessions had been made by both sides a settlement was reached and the mills got started. During this closing of the mills stocks of some kinds of material were pretty well used up, and in the last four months of the year material advances in prices took place. The long shut down of the mills last summer brought up more forcibly than ever before the matter of a perpetual wage scale, and the chances are that at the next conference with the Amalgamated Association, both manufacturers and workmen will try to get up a scale that will be continuous, and that will not expire, except by notice from either side. This matter is being strongly agitated in the ranks of the Amalgamated Association now, and officials of the American Steel Hoop Company and Republic Iron & Steel Company are urging it, so that a repetition of last summer's long shut down does not seem probable again for a long time. One of the contentions of the Amalgamated Association during the shut down was that the American Sheet Steel Company and American Tin Plate Company should not only sign the scale for the union mills, but also for the mills that were operated non-union before being taken over by those interests. This was flatly refused by both concerns, and they carried their point. In the Pittsburgh district there are so many sheet, tin plate and bar mills that are now non-union that the officials of the Amalgamated Association have about decided to throw these mills open to members of that organization. It has been a stringent rule of the Amalgamated Association that no member could work in a non-union mill and retain his membership. This, however, is likely to be changed, as there are so many non-union mills, and so many members that are idle because they are not allowed to work in them. No serious labor trouble occurred in the coke region in 1900 for the reason that the men received a voluntary advance in wages of 12½ per cent. on March 1 and are now being paid more money than ever before in the history of the coke business. In fact, coke workers are being paid on the basis of $2.50 a ton for furnace coke, and as it is now selling at $1.75 or less, it can be seen that the men have the best of it. Blast furnace labor is also very high, and has not been reduced in spite of the fact that Bessemer iron has declined fully $12 a ton from the highest price reached in 1899 and in the early part of 1900. It is not unlikely that furnace owners will insist on a reduction in labor if the price of iron does not improve. Skilled labor—that is, labor paid on a tonnage basis—is also getting very high wages, and readjustments are likely to be made early in the year by some of the leading steel interests. As against this, however, we may state that Jones & Laughlins, Limited, have notified their men that the wages now in force will be paid during 1900. Labor has certainly reason to be grateful for the prosperity that has come to the iron and allied trades in the last couple of years, making it possible to pay the highest wages, in most cases, that have ever been in force.

New Construction.

The year 1900 has been without parallel in the number of new plants that have been built, and that are now under way and being pushed to completion as fast as possible. There is no doubt that the large consolidations made in the iron trade in 1898-99 and 1900 are responsible for the most of this new construction, but not for all of it. The consolidated interests themselves are doing a good deal of new work, making strong places that are now weak and which give competitors an advantage. As in 1899, the Carnegie Steel Cmpany led the other interests in the Pittsburgh district in the enlargement of existing plants and the building of new ones. This great concern did not engage in any new lines of product in 1900, but may do so in 1901. It was gossip in the trade that sheets, pipe and rods were to be gone into at Duquesne, and on a very extensive scale, but so far nothing but preliminary work, and not much of that, has been done. It is not likely the Carnegie Steel Company will go into pipe for some time at least, as report has it that an agreement was recently made that postpones the building of a new pipe mill by one interest and a large open hearth plant by another. No actual work has been done by the Carnegie interest on the sheet or rod mills, and they may never be built. The principal new work done by the concern during 1900 was the building of the new plate mills at the Homestead Steel Works, the Howard Axle Works, and a new basic open hearth plant at Duquesne Steel Works containing 12 50-ton furnaces. New work under way consists of two new Carrie blast furnaces, a new bridge across the Monongahela River to take hot metal from the Carrie furnaces to the Homestead Steel Works,

new small billet mills at Duquesne and a very large merchant bar mill at the same plant. These latter two plants will not be completed for six months or more. The capacity of the Carnegie Steel Company for turning out pig iron, steel and finished material is enormous and is steadily being increased. With the two new Carrie furnaces finished, this concern will be able to make close to 3,000,000 tons of pig iron annually. In steel they have turned out at Homestead, Braddock and Duquesne close to 250,000 tons of ingots in a month, and with all the new open hearths at Duquesne finished their output of Bessemer and open hearth steel will approximate 275,000 tons or more every month. In plates, they are much the largest producers in the world, and can turn out fully 2500 tons per day, or more, when all their mills are running. The Edgar Thomson mill at Bessemer has made a phenomenal record in rails, having turned out an average of over 2200 tons every working day in 1900.

Next to Carnegie Steel Company, Jones & Laughlins, Limited, made most improvements to existing plants and in building new ones. This concern are in position now to make pig iron, steel and finished material as cheaply as any of their competitors. During 1900 they built some new mills at their works on the South Side, very much increasing their capacity in nearly all kinds of finished material. This firm make a greater variety of product than any other iron and steel concern in the country. They roll down to 3-16 rounds and turn out ingots of the largest size. They have put in new mills that will permit them to make beams up to 24 inches. They have also put in some new mills and other necessary equipment by which they will be able to roll rods in a very short time. The most important new work under way by them is the building of the Eliza furnaces on Second avenue. This plant is to contain four modern blast furnaces of the largest size, and each capable of making not less than 600 tons of metal per day. Two of these stacks are finished and in blast, a third is about ready, and the fourth will be blowing in three or four months. This firm also own the Soho Furnace, good for 300 tons a day, so that with the four Elizas blowing they will be able to turn out from 2500 to 2700 tons of iron daily, about enough to meet their converting capacity. The Monongahela connecting bridge, running from their Eliza furnaces to their steel works on the South Side, is being remodeled so as to allow hot metal to be taken across it. This firm will be using the hot metal process in a very short time. They will also increase the size of their converters and are making other extensive changes in their steel works.

The American Steel & Wire Company have nearly finished the building of a 600-ton blast furnace on Neville Island, but it may not be started for some time. Ground has been laid out for more furnaces, steel works, rod and wire mills, but none of this new work has been taken in hand and probably will not be for some time. The American Steel & Wire Company have steadily increased their holdings of property on Neville Island and now have between 75 and 100 acres, giving a most desirable manufacturing site. The concern have made improvements to existing plants in the Pittsburgh district, considerably increasing their capacity for making rods, wire nails, wire and fencing. Their Edith blast furnace in Allegheny has been remodeled and started up lately, after being idle the greater part of the year. All the plants of this concern in the Pittsburgh district, embracing Edith Furnace, Twenty-sixth street Bessemer mill, Oliver Works, Rankin and Braddock works, are now in full operation. The Pressed Steel Car Company finished their new car works at McKees Rocks, and also enlarged the Allegheny works, giving the concern a daily capacity of 60 to 75 completed steel cars at both works.

The most important new concern organized in the Pittsburgh district, and who are now building new works, are the Union Steel Company, which concern are putting up a large plant at Donora, a new town on the Monongahela River, and some 40 miles from Pittsburgh. The plant is to consist of a 600-ton blast furnace, an open hearth steel plant, rod, wire and wire nail mills. The work of construction is being pushed as fast as possible, and the rod and wire mills will be running in the early summer. When these have been completed, the blast furnace and steel plant will be built. The firm will buy their steel in the open market until their own plant is ready. A good deal of money is behind this enterprise, and it will be an active competitor for trade in rods, wire and wire nails.

There were also built in the Pittsburgh district during 1900 some large iron and steel casting plants. The largest of these is the works of the Pennsylvania Malleable Company, located at McKees Rocks, Pittsburgh. This plant is an identified interest of the Pressed Steel Car Company, and adjoins the McKees Rocks works of that company. The steel casting plant of the Pittsburgh Steel Foundry at Glassport was also built. Superintendent is Stewart Johnston, who was formerly general manager for American Steel Casting Company. Another plant put up during 1900 was that of the Duquesne Steel Foundry Company, at Coraopolis, a few miles from Pittsburgh on the line of the Pittsburgh & Lake Erie Railroad. The plant of the Union Steel Casting Company in Pittsburgh may also be considered a 1900 enterprise, as it was not completed until late in 1899. These concerns all put in open hearth furnaces, considerably increasing the output of open hearth steel in the Pittsburgh district. Most of the Pittsburgh iron and steel concerns made additions to equipment during 1900 in order to take care of increased business. An important new plant now under way is that of the American Axe & Tool Company, at Glassport, Pa., on the Monongahela River, a few miles above Pittsburgh. It is the purpose of this concern to centralize their manufacturing operations as much as possible in the Pittsburgh district, as it is from this city they buy nearly all their raw material. They desire to be as close to this as possible in order to save freight and other charges.

Outside of the Pittsburgh district the most important new works are those of the Sharon Steel Company, located at South Sharon, Pa. This new plant has been repeatedly referred to in these columns and consists of a blast furnace, open hearth steel plant, sheet mill, tin plate mill, rod, wire and wire nail mills. It will be one of the largest plants ever built, and will be a keen competitor of existing concerns in the above lines of product. Identified with it are Frank H. Buhl, who built the plant of Buhl Steel Company, at Sharon, Pa., which was afterward sold to the National Steel Company, and John Stevenson, Jr., who was formerly connected with Shenango Valley Steel Company, New Castle Wire Nail Company and Shenango Tin Plate Company, which were taken over by National Steel Company, American Steel & Wire Company and American Tin Plate Company. Mr. Stevenson is a man of recognized ability, and his connection with the Sharon Steel Company will give that concern the benefit of his wide experience in the lines of manufacture in which the company will engage.

Another important company organized in the second half of 1900 was the Sharon Steel Hoop Company, who are now erecting a large mill for making hoops, bands and cotton ties at South Sharon, Pa. Identified with them are some parties who were formerly with the American Steel Hoop Company, but who have severed their connection with that concern. The Sharon Steel Hoop Company expect to be in the market as producers along in May or June next.

In the last two or three months numerous other new enterprises have sprung up in and about the Pittsburgh district, mostly in the lines of sheets and tubes. Among these may be mentioned the Youngstown Iron, Steel & Tube Company, who propose to build a large plant at Youngstown, or one of its suburbs, for the manufacture of iron sheets and tubes. There is also the Niles Iron & Steel Company, who will put up a sheet mill at Niles, and the Parkersburg Iron & Steel Company, who will erect a sheet plant at Parkersburg, W. Va. The Youngstown Iron & Steel Roofing Company have just announced their intention of building a four-mill sheet plant at Youngstown, and will make black and galvanized sheets for their own use. At

Wheeling, the Wheeling Steel & Iron Company are putting up a tube mill to make tubes up to 8 inches in diameter, and will later on make up to 16 inches. There is talk of numerous other new enterprises, some of which will undoubtedly develop early in the year. From the above it will be seen that Pittsburgh has gone right ahead in the matter of keeping existing plants up to date in equipment, and also in the building of new ones.

Foreign Trade.

The extraordinary demand which the iron and steel manufacturers had for their product in 1889 put a halt to some extent in the development of foreign trade. With the slackening in demand which came in 1900 foreign trade was gone after more vigorously, and it has developed in a wonderful manner during this year. At the present time the Carnegie Steel Company maintain four foreign offices—one in Mexico, one in Russia, one in England and one in Canada. The National Steel Company opened offices in London in 1900, and all our large interests are represented in some way on the other side. The amount of material being sent abroad by leading interests like Carnegie Steel Company, National Steel Company, American Steel & Wire Company, Jones & Laughlins, Limited, and other smaller concerns, is simply enormous, and is increasing very fast. An innovation during 1900 was the direct shipment by the Carnegie Steel Company of a large lot of billets and other material to England by way of Pittsburgh, Bessemer & Lake Erie to Conneaut, thence to Ontario by Welland Canal and thence by Atlantic Ocean to Liverpool. The Carnegie Steel Company, aided by other concerns, have for some time been vigorously working in the direction of securing lower freights on export shipments, and while nothing has yet been done by the railroads, it is probable that early in 1901 a reduction in rates on iron and steel articles for export will be made. The ship subsidy bill introduced in the Senate recently by Senator M. A. Hanna has the warm approval of our local manufacturers. Provided low rates of freight could be secured, American manufacturers of iron and steel would be able to sell their entire surplus product on the other side, and at prices that English and German manufacturers would have trouble to meet. Our chief difficulty in this direction, however, has been to get shipping accommodations and cheap freights. However, during 1900 large shipments of billets, sheet and tin bars, rails, plates and almost every conceivable form of iron and steel were sent to foreign countries. Thousands of tons of plates have been sold by local mills to shipbuilders on the Clyde and other places. The development of our foreign trade is a matter of much satisfaction to our manufacturers, and it is believed that all previous records will be eclipsed during the new year.

Consolidations.

During 1900 some important consolidations in the iron and steel trades were made, among these being American Sheet Steel Company, American Bridge Company, the Carnegie Steel Company, the Crucible Steel Company of America, Standard Chain Company and Pittsburgh Valve, Foundry & Construction Company. The most important of these was that of the Carnegie Company, who have a total capital of $320,000,000, consisting of $160,000,000 of bonds and $160,000,000 stock. This concern have taken over the Carnegie Steel Company, H. C. Frick Coke Company and identified interests, and are the largest iron and steel manufacturing company in the world. The American Sheet Steel Company, who were organized early in 1900, took over all the black and galvanized sheet mills west of the Alleghany Mountains, with the exception of two or three concerns, a total of 30 in all. The capital of this company is $52,000,000, equally divided between preferred and common. The American Bridge Company, organized in the summer of 1900, took over two rolling mills, being those of Pencoyd Iron Works and New Jersey Steel & Iron Company, and 24 bridge building plants. The works in the Pittsburgh district absorbed by this concern were Keystone Bridge Works of the Carnegie Steel Company, Shiffler Bridge Works, Pittsburgh Bridge Company, Schultz Bridge & Iron Company and Youngstown Bridge Company, at Youngstown. The Crucible Steel Company of America were organized later in the year, and took over 13 rolling mills and steel works, the most important of these being the plants of the Park Steel Company, in Pittsburgh, and the new open hearth plant at Elizabeth. Other local concerns absorbed by the Crucible Steel Company of America were Aliquippa Steel Company, Beaver Falls Steel Works, La Belle Steel Company, Anderson, Du Puy & Co., and Singer, Nimick & Co. This concern have a capital of $50,000,000, equally divided between preferred and common. The Standard Chain Company were organized in the summer of 1900, and took over one rolling mill, that of the Columbus Iron Works, at Columbus, Ohio, and nine chain plants. The company have a capital stock of $3,000,000, one-half preferred and the other half common. The local chain plants taken over by the Standard Chain Company were Garland Chain Works and the Baker Chain & Wagon Iron Mfg. Company. The Pittsburgh Valve, Foundry & Construction Company were a consolidation of five of the leading foundries, pipe fitting and machine shops in Pittsburgh. The concerns taken over were Atwood & McCaffrey, Pittsburgh Valve & Machine Company, Limited, Shook-Anderson Mfg. Company, pipe fitting department of Wilson-Snyder Mfg. Company and the foundry of A. Speer & Sons. There was also one other important consolidation of interests in the Pittsburgh district in 1900, being that of Jones & Laughlins, Limited, of the American Iron & Steel Works. This concern were reorganized in the summer with a capital of $20,000,000, and took over the interests of Laughlin & Co., operating Eliza furnaces, the Monongahela Connecting Railroad, Lake Angeline Iron Company and other smaller interests. The organization of this concern, however, differs from those of other large consolidations in the fact that none of the stock was put on the market, and the capital stock of $20,000,000 represents actual investment in plants. At the present time there are no important consolidations in the iron and steel or allied trades under way, and it is probable that few important consolidations will be made during 1901. As stated above, however, important competition with nearly all of the large consolidations is springing up, and will be keenly felt before the end of the new year has been reached.

Pools in the Iron Trade.

During the year 1900 two important pools, or associations, were organized in the iron trade, these being the plate and billet pools. The plate pool was formed first, and is composed of the leading plate mills. The allotment feature prevails, the percentage in the pool being divided among the mills in proportion to their capacity for production. Much the largest percentage went to the Carnegie Steel Company. It is stated that the pool is based on an output of 1,200,000 tons of plates per year. When the pool was first organized plates were put at 1.25 cents for ¼ inch and heavier, the usual differential being charged for higher grades. In a short time prices were advanced to 1.35 cents and then to 1.40 cents, which is now the price in force.

The billet pool was organized after some considerable difficulty, the price of 4 x 4 inch Bessemer billets being put at $19.75, Pittsburgh, Wheeling and Valley districts, a schedule of delivered prices being adopted for other distributing points. The full tariff freight is not charged to outside points, part of the differential being absorbed by the mills. While the plate and billet pools have been conducted in a way that is probably satisfactory to consumers, and prices kept at a conservative point, based on the cost of raw material, yet at the same time pools or price agreements can hardly be commended. In the first place they are a confession of weakness, in the fact that manufacturers find it necessary to get together and hold prices by agreement. Again, this often results in prices being put to a point where they encourage competition and lead consumers to take up the matter of supplying their own raw material. Just as soon as the price of billets is put to a point where the consumer thinks it is higher than it ought to be he commences to figure on the price of an open hearth plant to make his own steel.

The Outlook for 1901.

The year 1900 closes with the finishing mills full of work for the next two or three months, the steel plants well employed and some improvement in the pig iron trade. The outlook for 1901 may be said to be fairly satisfactory. With present price of raw and finished material, manufacturers believe that there will be sufficient demand to keep their plants fully employed. With the rapidly expanding export business our surplus product is expected to be well taken care of, and this ought to insure that steady operation of mills and work shops by which is secured minimum cost. While it is not believed that prices during 1901 will reach anything like the high figures obtained in 1899 and early in 1900, yet they will probably stay at a point that will allow producers a fair margin of profit.

Pig Iron.

When the blast furnace owner compares his profits in 1900 with those of 1899 it is probable that he will be keenly disappointed. However, the furnaceman would hardly feel justified in expecting to make as much money out of his furnace this year as he did last year, which was a record breaker in profits and everything else, and the equal of which the present generation may never see again. In 1899 the furnaceman had the benefit of low priced ore and coke, while wages in the early part of the year were very much lower than at any time in 1900. While it is true that the price of pig iron at the opening of 1900 was about as high as at any time in 1899, yet the demand had fallen off a great deal, and many of the furnaces had blown out, unable to dispose of their product. In the fall of 1899 tonnage in the iron business had fallen off very perceptibly and the furnaceman was confronted with a very much smaller demand for his product. Prices of pig iron were held up by artificial means, which probably did more damage than good to the market. On January 1, 1900, there were in blast in the United States 280 furnaces, with a weekly capacity of 294,186 tons, against 200 furnaces on January 1, 1899, with a weekly capacity of 243,516 tons. The output of pig iron in 1899 was in round numbers 15,000,000 tons, but in 1900 is expected to be somewhere between 12,000,000 and 12,500,000 tons. The Pittsburgh district, which produces about 25 per cent. of the total pig iron made in the United States, has not only held its own, but has shown a marked increase in production, and will show further large increases in output in 1901. This will come about through the building of four new Eliza furnaces by Jones & Laughlins, Limited, two new Carrie stacks by Carnegie Steel Company and one and probably two stacks by American Steel & Wire Company on Neville Island. It is probable that when these seven or eight new stacks are completed the Pittsburgh district will be able to turn out about 80,000 tons of pig iron per week, or approximately 4,000,000 tons per year. The Carnegie Steel Company will have, when the two Carries are finished, a total of 19 furnaces in the Pittsburgh district, and Jones & Laughlins will have five.

Bessemer.—At the beginning of 1900 the price of Bessemer pig iron was an artificial one, having been fixed by agreement, and was $24 at furnace, or $24.90, Pittsburgh. The market was exceedingly quiet, the large consumers of iron making practically enough to satisfy their own requirements and were not buying. The price of $24 was maintained by the larger steel interests, because they sold a great deal of material based on the price of pig iron, and the higher the average price of iron the higher price they obtained for this material. In January, however, very little iron was sold, but in the latter part of the month a leading steel interest bought some 15,000 to 20,000 tons. February opened with the market dull, and small lots of Bessemer being offered by outside interests at lower than the fixed price of $24. Some of the larger consumers of iron who had bought heavily at $22 to $24, and some of whose plants were idle, were not taking out their iron and stocks were accumulating very rapidly. The efforts of the furnaces to sell iron at this time for second and third quarters were futile, and the fixed price was being shaded. Eastern furnaces were offering pig iron delivered in the Pittsburgh district at much less than the prices fixed by the Valley furnaces. In the latter part of February there were a few sales of Bessemer iron at the reported price of $24, but most of the business was being done at lower figures. Early in March labor troubles broke out in the Shenango Valley and the four furnaces at New Castle were banked.

In March it was claimed that the output of furnaces for first half of the year had practically all been sold at the fixed price of $24, but this was not verified by subsequent events. The Valley furnaces had fixed a price for delivery up to July 1 at $24, but this was being steadily shaded, and it is believed very little, if any, iron was sold after April at that price. Practically nothing was done in April, only a few small lots of Bessemer changing hands at prices ranging anywhere from $23.50 up to $24.50, Pittsburgh. May opened with practically nothing doing, and some of the large steel plants, which had bought heavily of iron, were closed and shipments had been stopped; buyers were holding off, knowing that it was only a matter of a short time until the price would be reduced. Early in May a few sales of Bessemer iron were made at prices which were fixed by conditions surrounding the transactions. No open price was made on these sales, but they were made at much less than $24. By the middle of May it was impossible to sell iron at any price, and it was piling up very fast in the Valleys and also in the Pittsburgh district. It was being offered at $22 and less, without finding buyers.

In the first week in June a meeting of the leading pig iron and steel interests was held in New York City, and the price of Bessemer iron was reduced to $20, Pittsburgh, to commence with June shipments. This was practically a reduction of $5 a ton over the old price, which was $24.90. At this time a good many furnaces in the Pittsburgh, Valley and Cleveland districts were getting ready to blow out, some for repairs and others because they could not sell their iron and were only piling it. Very little iron was sold at $20, for as soon as this price was fixed outside interests offered iron at lower prices in order to effect sales. June closed with the nominal price of Bessemer iron $20, but with actual sales being made at $18.50 to $19 and perhaps less.

The situation was a desperate one for the furnace interests, and as a result a meeting of the leading steel interests and the Bessemer Pig Iron Association was called for Thursday, July 5, to be held in New York City. This meeting was attended by the principal pig iron and steel interests from all over the country, and after a careful review of the situation it was decided to throw the market open on pig iron of all kinds, and at once Bessemer was offered at $16 at Valley furnace, equal to $16.90, Pittsburgh. This did not bring out any buyers, and iron could have been bought at this time at $15 or less. At this time a scheme was under way to control production of pig iron and billets, and a meeting of the pig iron and steel interests was held in New York on Thursday, July 19. The scheme was to shut down enough furnaces to take surplus iron out of the market, the steel interests in turn to shut off enough capacity to take surplus steel out of the market. The situation was gone over very carefully at a subsequent meeting held in Chicago, on Thursday, July 25, but owing to conflicting interests nothing was accomplished. At this time the market on pig iron, and everything else in fact, except beams and channels, was an open one, and low prices were being made to secure tonnage. August opened with the Bessemer iron market at practically a standstill. Metal was being offered at about $16, Pittsburgh, without bringing out any buyers. The situation in the Valleys and in the Pittsburgh district as well was steadily growing worse, and at a meeting of the furnace interests held about the middle of August it was decided to shut down all the furnaces in the Mahoning Valley, except Andrews and Hitchcock and Brier Hill. At this time some of the furnaces had iron piled up until it was almost impossible to see the furnace. In the latter part of August several large coupler concerns came in the market and bought round blocks of Bessemer iron at about $13, Valley furnace. Early in September the price had gone off still further, and Bessemer iron sold in Pittsburgh at $13.50 to $14. At this time Valley iron was shut out of the

Pittsburgh market. The situation in Bessemer was practically unchanged throughout September, demand being for small lots and prices continued low. About September 20 the Eastern Malleable Association came into the market and bought about 12,000 tons of malleable Bessemer iron at a price somewhere about $11.50 at Valley furnace. Some low phosphorus Bessemer was also sold at this time at $21 to $22, Pittsburgh. In the last week in September standard Bessemer iron sold at $13.50, Pittsburgh, and in the first week in October $13 was done, equal to $12.10, Valley furnace. There was a good deal of iron being offered with very little selling, and the result was that prices got to a low point, in some cases below cost of production.

By the middle of October the result of the election was being discounted, and prices of Bessemer iron got a little firmer, sales being made at $13.25 to $13.50, Pittsburgh. No large buyers were in the market, but there was a fair movement in small lots. October closed with Bessemer iron being quoted at about $13.15, Pittsburgh, equal to $12.25, Valley furnace, a price that was below cost of making with some of the Valley stacks. On November 8 a meeting of the Valley furnaces was held in Cleveland and the situation was gone over carefully, but nothing was done. There was a report that the price of Bessemer iron was to be put at $13, Valley, for first half of 1901, but from the fact that no inquiries for iron were before the association, it was useless to do this. Owing to the fact that so many furnaces in the two Valleys had been out of blast during the summer and fall months, while the consumption of iron had slightly increased, the situation as regards stocks had materially improved, and reports submitted by the furnaces at the meeting in Cleveland on November 8 showed that the 13 furnaces in the association had only 51,000 tons of Bessemer iron in the furnace yards unsold. However, there was a great deal more iron than this piled up which had been sold, but not shipped. November closed with the price of Bessemer iron about $13 at furnace, but very little doing. The rapid decline in price of Bessemer iron made it imperative for furnaces to get lower prices on ore and coke, and in the latter part of November it was stated officially that Bessemer ores for 1901 would be about $4, as against $5.50 for 1900. By this time the situation had so materially improved as regards stocks, while the tone of the market was firmer, that a number of the furnaces that had been idle through the summer and fall months had started up and others were getting ready to blow in. December opened with the market quiet and prices of Bessemer running from $13.50 to $14, Pittsburgh. At this time a leading local interest sold two blocks of Bessemer iron of 5000 tons each on an exchange basis, taking scrap in payment. Additional furnaces in the two Valleys had blown in by December 15, and production was materially increased. However, the large volume of business in finished material was giving the steel works and rolling mills plenty of work, with the result that the increased production was being taken care of and stocks of iron were being steadily depleted. December closed with the Bessemer market practically unchanged, prices ruling at about $13.25 to $13.50, Pittsburgh, with reports of large blocks of iron being offered at $13 or lower for delivery in first quarter and first half of next year. The above review shows that the price of Bessemer pig iron declined during 1900 from $24.90, Pittsburgh, to $13.50 or less, nearly $12 a ton.

Gray Forge.—The decline in price of gray forge iron during the year was not so large as in Bessemer, but at the same time was large enough to cut down very materially the profits of the furnace. January opened with standard brands of forge iron being quoted at $21 to $21.25, Pittsburgh. The market at this time was firm and a considerable tonnage was being sold. The Bessemer Furnace Association was trying to control price of forge iron and was quoting $21, Valley, but iron was selling at about $21.50, Pittsburgh. A local consumer bought in the last week in January about 7000 tons of forge, partly local and the rest Southern. In the first half of February there were further sales of local forge at $21, Pittsburgh, while Southern was being brought in at $20.50. There was a liberal buying movement in forge all through February, but in the latter part of the month prices eased up and in first week in March a material decline took place, local Bessemer selling at this time at about $20.50, Pittsburgh. In the latter part of March some Eastern mill iron was sold in the Pittsburgh district at about $20, which helped to further weaken the price of local iron. By the middle of April local forge had declined to about $20, Pittsburgh, and the market was weak and quiet. By the middle of May the price had gone off still further, and standard brands were being offered at $19 to $19.25. The first week in June saw considerable pressure on the part of the furnaces to sell iron and prices went off very fast. Standard forge was offered at $18, and actual sales were made about June 15 at $17 to $17.50. Prices declined through the summer months, with the demand very dull. In the first week in July Southern forge was offered at $15.50 to $16, delivered, Pittsburgh, and local forge was about $16.50. By the end of July prices had gone off fully $1.50 a ton and local forge was being offered as low as $15, with reports of sales at $14.50. In August many of the mills were closed owing to labor troubles, and there was very little movement in forge iron in that month or in September. A good deal of iron was piled at the furnaces, and it was being offered at very low prices. In the first week in September forge was being offered at $13, Pittsburgh, and sales were made at less than that price. The market showed little change during September, but in the first week in October standard brands of forge were offered as low as $12.50, Pittsburgh, equal to $11.60, Valley furnace. The market did not show any improvement whatever in February, but, on the contrary, there were reports of sales as low as $12, delivered, Pittsburgh, equal to $11.10, Valley. However, at this time practically no Valley iron was coming into the Pittsburgh district on account of the low price. In November there were several sales of good sized lots of standard forge at $12.25 to $12.50, Pittsburgh, and by November 15 the market had shown some improvement in prices. In the last week in November gray forge was quoted at $13 to $13.25, Pittsburgh, and some iron was sold at these prices. The first half of December the market on gray forge was fairly active, and sales were made at prices ranging from $13.25 up to $13.50, Pittsburgh, the latter price for special brands of iron. The last half of the closing month of the year was extremely quiet, and prices on gray forge, in sympathy with Bessemer, eased off slightly, standard brands being offered freely at $13.25, with a probability that on a firm offer $13, Pittsburgh, could be done. The decline in price of forge iron during 1900 was from $20.25 to $12.50, Pittsburgh, or say $8 per ton. This comparison is made on the highest and lowest prices during the year.

Foundry Iron.—The market on foundry iron during 1900 was without special feature. Prices declined very materially during the year, in sympathy with Bessemer and mill iron, and January opened with the price of No. 1 foundry $23; No. 2, $22.50, and No. 3, $23. The market declined steadily during the year and December closed with No. 1 being offered at about $15; No. 2, $14.50, and No. 3, $14, a decline of fully $8 a ton during the year. In the summer months some exceptionally low prices were made on foundry iron, a number of the furnaces having large stocks and being very anxious to sell.

Steel Billets.

The billet market in 1900 as regards prices was much the same as that of Bessemer iron. The course of prices during the year was steadily downward, the drop being from $35, the highest price, to $16, at mill, a decline of $19 a ton. The consolidations in the iron trade have brought about material changes in the steel business, and where there were formerly a dozen customers who would come into the open market and buy steel now there is hardly one. When the American Steel Hoop Company were organized they took over such concerns as J. Painter & Sons Company, Wm. Clark's Son & Company, Lindsay & McCutcheon, Union Iron & Steel Company, Portage Iron Company, Limited, and others, all users of billets in large quantities and all former buy-

ers in the open market. The Republic Iron & Steel Company also took over concerns who formerly bought billets. The American Steel & Wire Company, by absorbing such concerns as Pittsburgh Wire Company, Oliver Wire Company and others, took out of the market former large buyers of steel. The National Steel Company, being an allied interest of American Steel Hoop Company, the trade of the constituent concerns naturally goes to National Steel Company, while American Steel & Wire Company make more than half the billets they use, and will probably, if operations at Neville Island are prosecuted, make their entire supply. The Republic Iron & Steel Company have put themselves in position to supply their own billets by erecting a Bessemer plant at Youngstown, capable of turning out from 350 to 400 tons of billets per day. The result of this is that buyers of steel have narrowed down to a few local concerns in Pittsburgh and in the East, and some of these are covered by several contracts on a sliding scale arrangement, the base of which is the price of Bessemer iron f.o.b. Pittsburgh. The steel business is in the hands now of a few concerns, probably half a dozen in all, and is more easily controlled than ever before. This largely accounts for the forming of the billet pool and the fact that prices fixed by it have been firmly held.

It is not likely there will be many large extensions to existing Bessemer plants, or new ones built. The tendency seems to be altogether in the direction of basic open hearth steel. For a moderate amount of money a concern can put in new open hearth furnaces and make their own supply of steel. Open hearth practice has been perfected to such an extent that it is easily adapted now for any uses to which Bessemer steel can be put, and therein we think lies the weakest point in the billet pool. Should any attempt be made to put prices of billets at an exorbitant figure consumers of steel can readily find relief by building open hearths and making their own steel.

Aside from the rapid decline in prices the principal item in the year 1900 in the billet trade was the formation of the billet pool. The pool started off by fixing the price of Bessemer billets for Pittsburgh, Valleys and Wheeling delivery at $19.75. A scale of delivered prices for nearly every distributing point has also been adopted, the mills absorbing part of the freight. So far, it is stated that the workings of the pool have been very satisfactory. The allotment feature prevails, all orders being sent to the commissioner, who occupies a similar position in the rail pool, and the distribution of orders is made to the mills based on their percentage in the pool. There is a cash forfeit up for violation of the agreement, and with the billet business simplified as it has been in the past two years, it looks very much as though the pool might go on indefinitely. Pittsburgh is not much of a seller of billets in the open market. In this district there are four Bessemer plants, these being Carnegie Steel Company, who use nearly all the steel they make; Jones & Laughlins, Limited, who also use practically all the steel they turn out, being sellers only occasionally in the open market. The American Steel & Wire Company, with the Oliver and Hainesworth plants, use the entire product of both mills and the Bessemer plant of the National Tube Company, at McKeesport, all of which is used by that interest in the manufacture of steel skelp and tubes. There is also the plant of the Republic Iron & Steel Company, at Youngstown, but it is the intention of this concern to use their output in the manufacture of steel bars and other material. However, they are reported to have sold some steel, but will probably not be sellers right along. In New Castle there is a large billet and bar mill of the National Steel Company, all the product of which is sold in the open market. Also in the Youngstown district there is a large billet and bar mill of the Ohio Works of the National Steel Company.

The year 1900 opened with the steel market quiet and the price of Bessemer billets about $35, f.o.b., Pittsburgh. The whole month of January was dull, very little steel being sold, and the price went off in the latter part of the month to about $33. At this time there was supposed to be an agreement holding the price of Bessemer billets at $35, f.o.b. Pittsburgh, but it was not being absorbed, steel being freely offered at $2 to $3 a ton less. In February the situation was practically unchanged, very little business being done, with dealers nominally holding the market at $35, but quoting on any business coming up $32 to $33. In the month of March the same conditions ruled, steel being quoted at $32 to $33, with hardly enough being sold to fix a price. As far as tonnage was concerned April was also very dull, and in the latter part of that month prices went off rapidly, steel being offered in the last week in the month at $30 or less, maker's mill. At this time the Youngstown and Columbus works of the National Steel Company were idle for several weeks on account of dull trade. In May prices of billets went off pretty rapidly, $27 to $28 being quoted in the latter part of the month. In the first week in June a meeting of the billet interests was held in New York, and the unsatisfactory condition of the steel trade was thoroughly gone over in a two days' session. The price of Bessemer billets was fixed at $28 and open hearth at $29. Consumers were buying from hand to mouth, knowing that the market was top heavy and that prices were about to decline. The fixed price of $28 was not observed for any length of time, as in the latter part of June billets were being offered at $25, Pittsburgh, without gettting business. At this time it had been pretty thoroughly demonstrated that the billet market could not be held artificially, and at a meeting of the pig iron and steel interests held in New York on July 5 it was decided to throw open the steel market and immediately prices slumped off to about $22, Pittsburgh. This had the effect of scaring buyers worse than ever, and the first week in July saw a shut down of the sheet, tin plate and bar mills on account of wage scale troubles with the Amalgamated Association. This caused a big falling off in consumption of steel, and the result was that the steel market, as far as tonnage was concerned, was about as dull as it could be. All through July billets were being quoted somewhere about $18 to $19, Pittsburgh, on the small tonnage that was being offered.

In the latter part of July another meeting of the steel and pig iron interests was held in Chicago, but nothing was done. The first week in August Bessemer billets were quoted at about $17 to $18, Pittsburgh, but very little doing. In the latter part of that month sales of billets were reported as low as $16, maker's mill. The situation was extremely dull through September, the price of billets running anywhere from $16 to $17. This condition prevailed right through October, demand for steel being extremely dull and low prices being made by the mills on any business that came up. There was some attempt made in the latter part of the month to fix a price on billets, but nothing was done. This was really the initial movement in the formation of the billet pool. At the first meeting two of the leading mills were not present, but on Wednesday, October 31, another meeting of the steel interests was held in the Holland House, New York, and the situation was gone over very carefully, plans being made to organize a pool. Another meeting was held in New York on Thursday and Friday, November 8 and 9, with the result that the billet pool was formed and the price of Bessemer billets, 4 x 4, was put at $19.75, delivered, Pittsburgh, Wheling and Valley districts; less than 4 inches and down to 1½ inches, $1 advance; basic open hearth billets up to 0.015 carbon $1 higher than Bessemer; sheet and tin bars being put at $1 a ton higher than billets. Subsequent meetings of the pool were held in November and early in December and final details consummated, making the pool, it is claimed, the strongest ever formed in the steel trade. No changes were made in prices in any way up to the close of the year. On the authority of one of the members of the pool we can state that billets will not be advanced unless higher cost of raw material should make it necessary to do so. However, with lower costs coming in the making of Bessemer pig iron, it is probable that prices of billets may be reduced instead of advanced. The amount of business done by the billet pool since it was organized has, as expected, been small,

but there has been a steady increase in tonnage each week, and at the close of the year a fair amount of orders is being taken by the mills at pool prices.

Steel Rails.

The rail trade in 1900, both as regards tonnage and average of prices, has been decidedly satisfactory to the mills, and profits have been very large. It will be recalled that in the rush of orders for rails and other materials in 1899 the mills carried over into 1900 a very large tonnage, and at high prices. It can be conservatively stated that on January 1 the rail mills had on their books from orders carried over from 1899, and also new tonnage booked, fully enough rails to take their output for the first four months of the year, or longer. The price of rails at the opening of 1900 was $35 at mill for standard sections, and this price continued without change for some months. By June 1 it was estimated that the rail mills had booked orders up to that time for over 1,800,000 tons of rails for delivery in 1900. It was also expected that the additional requirements of the roads would run the total for the year to over 2,000,000 tons, and it is probable that when the year's business has been footed up it will be found to have exceeded that amount. At this time large orders for export were being entered by the mills, one order in the latter part of May being for 10,000 tons for Canada, and another for 7000 tons for Mexico. The price of $35 on rails was maintained right through the year until September 20, when a meeting of the rail interests was held in New York, at which the price was fixed at $26 at mill, and this price held for the balance of the year. The putting of the price at $26 was somewhat of a surprise to the trade, as it was confidently believed a lower price, about $22, would be made. At this time billets were selling at about $17 or less, the spread between rails and billets being $9 a ton or more. Right after the price of $26 was fixed reports were going that large lots of rails had been sold at $24 a ton and even less. Subsequent developments, however, proved that these reports were untrue, and it is stated by the rail interests that no rails have been sold at less than the fixed price. The first large order placed after the price was put at $26 was that of the Pennsylvania Railroad, which came into the market in October for 150,000 tons. The Carnegie Steel Company in that month took an order for 6000 tons of rails for New Zealand, and also other large orders for export. In November the Chicago & Northwestern Railroad placed an order for 60,000 tons, and this was followed in December by the Lake Shore interests buying 80,000 tons. A good many smaller orders have been placed and in the latter part of December it was claimed by one of the rail interests that about 1,000,000 tons had been booked for 1901, and that the rail tonnage for the new year would be between 1,500,000 and 1,750,000 tons. The Edgar Thomson mill turned out an enormous tonnage in rails in 1900, the average output for every working day of the year being over 2200 tons. In the latter part of December the Carnegie Steel Company took an order for 6000 tons of rails for the London & Great Eastern Railway of England for prompt shipment. The export business in rails in 1900 has been a very satisfactory one. Of course prices realized in many cases are low, the pool price not applying on rails for export. Probably the most important development in the rail trade in 1900 was the bringing out of the Kennedy-Morrison process for rolling rails, by which it is believed that the life of heavy rails will be materially lengthened. A full description of this new process appeared in *The Iron Age* of December 20. We may state, in concluding this article on rails, that there is a probability that the price may be advanced, say to $28, during January.

Finished Material.

Beams and Channels.—The demand for structural material in 1900 has been large right through the year, and the tonnage turned out by the mills will considerably exceed any previous year in the history of the structural trade. It is probable that when the output of beams and channels in 1900 has been footed up it will be found to considerably exceed 500,000 tons. The beam agreement among the leading six mills, consisting of Jones & Laughlins, Limited, Carnegie Steel Company, Phœnix Iron Company, Pencoyd Iron Works, Cambria Steel Company and Passaic Rolling Mill Company, was renewed in December for the year 1901, making the fifth year of its existence. Material improvements were made in the beam mills of Jones & Laughlins and Carnegie Steel Company. The former concern made additions to equipment during the latter part of the year which will enable them to roll 24-inch beams. A satisfactory feature of the structural trade in 1900 was the large amount of export business taken, far exceeding any previous year. The year opened with the price of beams and channels, 15-inch and under, 2.25 cents, f.o.b. Pittsburgh, the usual advance of 0.10 cent being charged for 18, 20 and 24 inch. There was no change made in prices until June 15, on which date the Beam Association met in New York City and made a cut of $7 a ton on structural material, with the exception of angles, which were reduced $9. This cut in prices was made on account of the rapidly falling market in raw material, and also to stimulate demand, which for two or three months previous had been dull. About this time the contract for the underground railway in New York City was closed, the material, some 70,000 tons, being mostly taken by Carnegie Steel Company. The cut of $7 a ton made the price of beams and channels, 15-inch and under, 1.90 cents. This price was continued until August 15, on which date the Beam Association held another meeting in New York and reduced prices $4 a ton, making the price of beams and channels, 15-inch and under, 1.50 cents; over 15-inch, 1.60 cents; angles, 3 to 6 inch inclusive, 1.40 cents; over 6-inch, 1.50 cents, and under 3-inch, 1.30 cents; zees were 1.50 cents; tees, 1.55 cents. These prices were continued without change for the balance of the year, and at this writing there are no indications of an early change in prices one way or the other in 1901. In the last three or four months of 1900 there was an enormous demand for structural material, and the mills were pushed to their utmost to get out stuff as fast as needed, and in some cases were two or three months behind in deliveries. The structural trade for 1900, viewed from every standpoint, has been decidedly satisfactory, and the outlook for 1901 could hardly be better. A heavy foreign trade has been built up, and this promises to increase right along. As in the case of other material on which there are price agreements, prices fixed by the beam pool do not apply on material for export, and the result is that much lower prices are being made on export business than on domestic.

Plates.—In the matter of meteoric advances in prices plates beat all records in 1899, and did the same in 1900 in the matter of rapid declines. The year opened with tank plate, 1¼-inch and heavier, selling at about 2.25 cents at mill, the usual differential being charged for the higher grades. Tonnage in January, 1900, was light, most of the mills going after business very aggressively, with the result that early in February tank had declined $2 or $3 a ton, and was being quoted at 2.10 cents to 2.15 cents at mill. There was only a fair demand for plates in February, and the month closed with the price about 2-10 cents at mill, but being shaded on good orders. Tonnage did not show much improvement in March, and prices declined still further, the month closing with sheared plates being quoted at 1.90 to 2 cents at mill. The situation in April was much the same as in March, demand being only moderate and prices being cut on any desirable business coming up. Buyers were placing orders only for actual wants, the course of prices since the first of the year having been steadily downward, and there being no incentive to buy ahead. In the first week in May the situation in plates was considerably demoralized and sheared plates were being offered at 1.75 cents mill, and this was being shaded on good orders. Prices declined steadily through that month, and in the first week in June they were offered at 1.60 cents at mill. At this time billets were selling at about $28, and the price of plates was regarded as exceptionally cheap. In spite of this buyers held off, and in the first week in June tank plates had declined to 1.40 cents at mill. At this time some large orders for plates for shipyards were

being taken on which low prices were being made. Demand was somewhat better, but prices were weak and were being cut on good orders. In the first week in July sheared plates were being quoted at 1.20 to 1.25 cents at mill, with demand only fair. Buyers were pretty thoroughly scared, and in the latter part of July occurred the famous "Battle of the Giants," and on sheared plates 1 cent at mill was done, and even 0.95 cent on good orders. In August sheared plates were quoted at 1.05 to 1.10 cents and demand was very much better, the low prices bringing out heavy tonnage. The plate mills booked such heavy orders in August that a few of the leading mills became firmer in their ideas as to prices, and in the first week in September the tone of the market became stronger and tank plate was held at about 1.10 cents at mill. The market through September showed continued betterment both as regards demand and price, and the first week in October saw the price of plates about 1.15 to 1.20 cents at mill, with some sellers quoting higher. Heavy orders were being placed at this time by the shipbuilding interests, and a large export business was being done. Early in October the contract for the approaches to the East River Bridge was placed, a large part of this tonnage coming to Carbon Steel Company of this city. For some time the leading plate mills had been holding weekly conferences in New York with the object of trying to get the plate business on a better basis, and on October 25 a preliminary organization was effected, and the price of tank plate, ¼-inch and heavier, was put at 1.25 cents; shell, 1.30 cents; flange, 1.35 cents, and marine, 1.45 cents, all f.o.b. Pittsburgh. The Plate Association had taken in the Eastern and Western mills and was on a firm basis. On Thursday, November 8, another meeting was held, and a further advance of $2 a ton was made, putting the price of tank, ¼-inch and heavier, at 1.35 cents, with the usual differential for the higher grades. At this time an enormous tonnage in plates was being placed, over 150,000 tons being given out by three leading consumers. The details of the plate agreement had been pretty well fixed up by this time, and it was put on a very firm basis. On December 6 another advance was made, putting the price of tank quality, ¼-inch and heavier, at 1.40 cents, Pittsburgh, and the usual advance for the higher grades. The final details of the agreement had been closed up and signed, and everything was in first-class shape. No further changes in prices were made on plates until the close of the year, and it is probable that the price of 1.40 cents will not be changed unless either by extraordinary demand or advances in cost of raw material. A schedule of delivered prices on plates has been adopted and was published in *The Iron Age* of December 13. It is not the intention of the plate mills, we are advised, to fix arbitrary prices, but on the other hand they will be kept at a point that will allow a fair profit to the mills. It is stated that the leading plate interest at the close of the year had close to 400,000 tons booked and was not promising deliveries inside of two to three months. In fact this interest bought round lots of plates in November and December from other mills to help them out on their contracts.

Iron and Steel Bars.—To steel bars belongs the distinction of showing the greatest decline in prices of any line of finished material during 1900. At the opening of the year the price of steel bars was about 2.25 cents at mill, with trade quiet, buyers placing orders only for actual wants. At this time there was an agreement on steel bars among large producers to hold the price at 2.25 cents, but it was being evaded, good orders going at lower figures. There was no improvement in demand, and under pressure from the mills to sell prices went off in February several dollars a ton. The agreement among the steel bar mills was still in force, but was being violated right along. The Eastern mills were delivering bars in the Pittsburgh district at lower prices than local mills would name and were getting a good deal of tonnage. In April demand was very dull, buyers placing orders from hand to mouth, knowing that the fictitious price of 2.25 cents could not be held, and in fact was being shaded right along. About April 15 the mills in the agreement held a meeting and reduced prices to 2 cents, a reduction of $5 a ton. This did not help the market any, the outside mills continuing to shade it anywhere from $2 or $3 to $5 a ton. On May 16 the bar mills held another meeting and reaffirmed the price of 2 cents, the idea being that to reduce the price would not help the situation any. Consumers were placing very limited orders and the situation was unsatisfactory. Early in June prices went off very fast, and steel bars were quoted at 1.50 cents at mill, even this price being shaded on good orders. The situation did not change much until the latter part of June, when prices went off still further, steel bars being offered at 1.35 cents at mill. From this time into July the course of prices was steadily downward, and by July 15 the mills were selling steel bars at 1.10 to 1.15 cents at mill. In the latter part of July the large interests making steel bars went after tonnage very vigorously, and the life was cut out of the market. Report has it that contracts for round lots of steel bars were made as low as 0.87½ cent at mill, and while this may have been done in only a few exceptional cases, yet it is a fact that large quantities of steel bars were sold at 0.90 to 1 cent at mill, deliveries in some cases running over a whole year. In the last two weeks in July it is estimated that 200,000 to 250,000 tons of bars were taken by the leading interests. The natural result of this was that early in August the mills that had entered large tonnage became firmer in their ideas as to prices and the tone of the market was a little stronger. By September 1 bars were firm at 1.10 cents minimum, with some mills quoting higher prices. From this time up until the close of the year there was a steady improvement in demand, and prices advanced to 1.25 cents at mill, the ruling figure when the year closed. The trade in steel bars in 1900 was very large, but the average of prices has been comparatively low. The Carnegie Steel Company will be in the market in the summer of 1901 with a very large bar mill and will go after the large trade in steel bars vigorously. The course of the market in iron bars, both as regards demand and prices, was much the same as that of steel bars. The year opened with iron bars selling at 2.10 to 2.15 cents, Valley mill. Demand was quiet in the first half of the year, some of the mills of Republic Iron & Steel Company and American Steel Hoop Company being closed before July 1, owing to dullness of trade. On July 1 a general shut down of all the bar mills in the Central West took place, and they were idle until early in September. In the meantime prices of iron bars had gone off very fast in sympathy with steel bars and other material and mills were quoting 1.15 to 1.25 cents at mill. In the last three months of the year demand increased very fast, and at the close of the year most of the leading bar mills in the West were in operation to full capacity, and with orders ahead for several months. Prices were firm, the year closing with common iron bars being quoted at 1.30 cents, Valley mill, in carload lots, equal to 1.35 cents, Pittsburgh.

Merchant Steel.—The principal item of interest in the merchant steel trade during the year was the organization of the Crucible Steel Company of America, which concern took over 13 rolling mills and steel works making crucible and open hearth steel. As in the case with other finished material, prices at the first of the year were high, but demand dull. In the summer months prices declined very fast, low figures being quoted in July and August. In September the market improved some both in demand and prices, and this was maintained throughout balance of the year. In the last couple of months of 1900 the mills had plenty of work and at profitable prices.

Sheets.—In the sheet trade the principal item of interest in 1900 was the organization of the American Sheet Steel Company, which was consummated about April 1, Geo. G. McMurtry of the Apollo Iron & Steel Company being made president. The American Sheet Steel Company is a consolidation of 30 of the principal sheet mills and steel works in the Central West, the only sheet mills on the outside in the Pittsburgh district being Wilkes Rolling Mill Company at Sharon, Zug & Co., Pittsburgh, and Whitaker Iron Company at Wheeling. The two principal interests taken over by the American Sheet Steel company were Apollo Iron & Steel Company at Vandegrift and W. Dewees Wood Company at McKeesport. At the opening of the year black sheets were about

2.70 to 2.75 cents for No. 27 and 2.80 to 2.90 cents for No. 28. There was a moderate volume of business for the first three or four months of the year but in the summer months demand fell off very much, but prices were not sustained. In the latter part of August the outside mills, and also the leading interest, commenced to book tonnage heavily, and the tone of the market improved perceptibly. Demand steadily expanded in the last three or four months of the year, and 1900 closed with the price of No. 27 sheets about 2.85 cents and No. 28, 2 90 cents at mill. Galvanized sheets, on which some low prices were made during the summer months, were quoted at 70, 10 and 5 per cent. at mill, and for specially desirable orders 75 per cent. off was quoted. The outlook for the sheet trade for 1901 is exceptionally bright, and it is believed there will be a heavy volume of business and at very profitable prices. From the standpoint of profit the year 1900 in the sheet trade has been exceedingly satisfactory to the leading interest and also to the small outside mills.

Skelp.—Volume of business in iron and steel skelp during 1900 has been satisfactory, especially the last three or four months of the year. Like other lines of finished material, the skelp market was quiet in the first three or four months of the year and also in the summer months, but commenced to improve along in August and September, and prices advanced to some extent. The year closed with the price of grooved iron skelp about 1.50 cents and sheared about 1.55 cents, f.o.b. Pittsburgh. In steel skelp demand has not been so good, and prices were from $2 to $3 a ton less than on iron. At the close of the year grooved steel skelp was quoted at 1.35 cents and sheared at 1.40 cents, with very little doing.

Tubular Goods.—From the standpoint of both demand and profit the year 1900 in the pipe trade has been an exceptionally prosperous one. Demand for tubular goods has been heavy throughout the entire year, with possibly two or three months in the summer when prices sagged off a good deal and mills were going after tonnage very vigorously. The National Tube Company, by pursuing a conservative course, have helped to sustain the market throughout the year, and in the last two or three months of 1900 prices on tubular goods showed a material advance over figures ruling in the summer. In the last week of the year a deal was closed by which the Standard Seamless Tube Company of Ellwood City have been bought by the National Tube Company. In the Pittsburgh district there are five concerns outside the National Tube Company, these being A. M. Byers & Co., Spang, Chalfant & Co., Incorporated, Monongahela Tube Company, United States Tube & Iron Company, all of Pittsburgh, and the Atlantic Tube Company at Beaver Falls. In the East there are a number of tube mills outside the National Tube Company, the largest one of these being the Reading Iron Company at Reading. A very large foreign trade in tubes was done in 1900, shipments of the leading interest abroad being heavy almost the entire year.

Connellsville Coke.—In the first four months of 1900 the coke trade was extraordinarily active, the output week after week running from 200,000 to 220,000 tons. All the leading producers had more contracts than they could fill, and famine prices were paid. In some cases up to $3.50 to $4 a ton was paid for furnace coke for prompt shipment. In May the coke trade quieted down considerably, and in the latter part of that month a good deal more was being made than was being consumed, and the situation from the standpoint of demand was very unsatisfactory. In the first week in June the operators closed down fully 2000 ovens, cutting production to about 175,000 tons a month. Very little new business in either furnace or foundry coke was being placed at this time, and prices had gone off considerably from high figures reached in the early part of the year. In July nearly 4000 ovens in the Connellsville region were idle, and Connellsville furnace coke was being offered for balance of the year at $2.25 a ton. At this time blast furnaces were blowing out nearly every day and shut off shipments of coke. Demand for furnace and foundry coke for the summer months was extremely dull and almost every week additional ovens were blown out. In the first week in September nearly 7000 ovens in the Connellsville region were idle, output having been reduced to less than 150,000 tons per week. Strictly Connellsville furnace coke was being offered at this time at $2 a ton, and foundry $2.25 to $2.50, with very little demand. The coke trade did not show much change in the last three months of the year, only about two-thirds of the ovens in the Connellsville region being active, the rapid decline in price of pig iron causing furnaces to hold off placing contracts for coke for first half of 1901, and 1900 closed with very few contracts of furnace coke on the books of producers. It was being offered at $1.75 a ton, and some of the smaller operators were naming slightly lower figures. Demand for foundry coke in the last month of the year was much better than for furnace and it was quoted at $2.25 to $2.50 a ton. Some new coke works were built during the year in what is known as the Klondyke field, the Bessemer Coke Company of Pittsburgh starting up several new works which are now being operated. The coke trade was entirely free from labor troubles during the year, with the single exception of a slight outbreak at one of the works of the Bessemer Coke Company. Coke workers are being paid much the highest wages ever known in the history of the coke trade, but whether the operators can continue to pay such high rates in the face of a rapidly declining market remains to be seen.

The English Engineering and Iron Trades.

One of the most comprehensive annual reviews issued by English merchants is that of Bolling & Lowe of London, which we reproduce below:

As we can see no signs of any radical change taking place in the iron, steel and kindred trades during the remaining few days of the year, we now issue our annual report as usual.

Ore.—The question of future supply of iron ore to Great Britain is of great importance, as we still depend very much upon that imported from Spain and elsewhere. The United States have their home supplies well developed, and Germany, while importing from Spain and Scandinavia, &c., is in a similar position, having large reserves of ore in their own countries.

Pig Iron.—It is a matter of interest that the present stock of pig iron in Glasgow (Connal's) stores is lower than it has been for 20 years, being under 80,000 tons, whereas in the year 1887 the record stock was held, amounting to nearly 943,000 tons.

Finished Iron and Steel.—The year has been a prosperous one for manufacturers, who have been busy with home and export orders. During the last few months, however, fresh business has been difficult to obtain and a general weakening of prices has commenced. So far as we can judge manufacturers are likely, for a time at any rate, to make further concessions.

Tin Plates.—There is very little to say about this article, now that the American market is practically closed to us, except that we may shortly find American manufacturers competing in this trade as in others.

Locomotives, Machine Tools, &c.—All works connected with their manufacture have been busily employed, especially as regards locomotives and rolling stock, and most makers of these have orders on hand which will take a long time to execute.

Shipbuilding in the United Kingdom has not been on such an extensive scale this year, buyers, confident of reduced prices in the near future, holding back their orders. The designing of vessels has reached such perfection that ships of 10,000 tons burden do not require a larger crew than was necessary 20 years ago for a ship of 3000 to 4000 tons, steaming at 10 to 12 knots an hour with hardly any greater coal consumption. Referring to our remark as to the lack of fresh orders, it may be interesting to note that prices of steamers are to-day 35 per cent. above those in 1897, while at the beginning of this year they were as much as 50 per cent. higher.

Coal.—Last year's output is expected to be exceeded

and to approximate 230,000,000 tons, in spite of enhanced prices. Of this quantity about 60,000,000 tons have been exported and the remainder, 170,000,000 tons, consumed at home by industrial concerns, railways, gas works, &c. In consequence of the advanced cost of fuel makers of finished materials have naturally raised their prices and the foreign consumer has doubtless paid for the increased value of about 100,000,000 tons of coal—say £25,000,000. The tonnage is made up approximately of 60,000,000 tons shipped as above and 40,000,000 tons represented in the working up of material for export. Every additional advance of 1 penny per ton on the price of coal means, on the total output, about £1,000,000 extra profit. Wages in the South Wales collieries are now higher than they have ever been. Owing to the high price of coal great impetus has been given to the employment of liquid fuel, which is found principally in Russia, United States and the East. It will doubtless be more extensively used in the future. It was officially announced in St. Petersburg on October 25 that the Ministers of Ways of Communication had decided to use naphtha on all locomotives running on the Russian railway system.

The "Boom" has passed, but these cycles of prosperity are not so beneficial as is imagined, owing to the enormous speculation, not by consumers, but by a certain trading class with little or nothing to lose and everything to gain, and by outsiders who simply want to "spec." To our knowledge some months ago certain works had sold every ton of their make for delivery over this year. Unfortunately specifications against the contracts have not been forthcoming and the material has been in the market again, and sold in part, at prices much lower than those at which the original contracts were made. The first buyer may have had to pay something to cancel the contract, but in the meantime the material is offered right and left, and in consequence the end of a "boom" is in sight.

Stocks of Iron, Steel and Coal.—All parts of the world can be reached by steamer from Europe within six weeks, with the exception of the Northern Pacific ports, and large stocks are only kept as a speculation. The tendency now seems the other way—*i. e.*, to keep as small supplies as possible—as, in the opinion of the trading community, the capital locked up and loss of interest are not sufficiently compensated by the value of merchandise held in stock, which has to be disposed of at varying values in the unknown future.

Electricity.—The continued increase in all branches dealing with this energy is a matter for congratulation. Its advantages as an illuminant, and as the tractive force for tramways and railways, are increasingly appreciated, and our manufacturers are finding electrically driven machinery more effective, speedier and cheaper than was the case with steam. Colliery companies have made considerable advance in its adoption for mining coal and lighting the workings.

Railways.—As usual, the rates cause much dissatisfaction, carriage on all material being excessive when compared with what our foreign competitors pay. A new question has arisen which should be carefully considered, whether the English railway companies act in their true interest in buying their rails and rolling stock abroad, provided such can be obtained upon reasonable terms at home. By purchasing from the foreigner they are depriving numbers of British workmen of employment, not only in the handling of the raw material, but of the manufactured articles also. It is not the few pounds so saved by a company which will materially improve their financial position, but in doing their utmost to assist the British manufacturer in dealing with the rate question and in finding employment for the workmen who form the backbone of the railways' customers. The mileage in the United Kingdom is now about 23,000 miles, having cost about £1,100,000,000. We should have to look far back in the history of London to find any scheme that has met with such immediate and unqualified approval as the Central London Railway (electric). No greater testimony to the benefit of this mode of transit could be found than the complaints of overcrowding, which appeared immediately after its opening, even with a service of trains every few minutes. The "tube system" is firmly established in London, and the Waterloo and Baker Street and Hampstead and other contemplated lines will, when completed, further unite various parts of this great city. The Provisional Order for Railway and Canal Bills before the House of Commons this year amounted to a very large sum. Many of these schemes will not be sanctioned, but those that come into force will help home trades and find employment for the accumulated capital of prosperous years. Considerable progress in the construction of light railways has been made, and is the beginning of a much needed development.

Exports.—It is noticeable that the values are much higher than those of last year, but the quantities represented do not show a proportionate increase, as enhanced prices naturally check demand; we foretold this in our report last year. Thus the quantity of pig iron exported for the 11 months represents 41¼ per cent. of the total weight of iron and steel exported, while the value of same only amounts to about 20 per cent. of the gross. The tonnage of rails exported has decreased to a comparatively insignificant figure, amounting to only about 343,852 tons for the first 11 months.

Germany.—The German Foreign Office has been for some time engaged in ascertaining to what extent German capital is employed in foreign countries, and it has arrived at the following: Exclusive of Europe and the United States, and amounts invested in foreign loans, German capital is employed to the extent of about £350,000,000 to £375,000,000 in commercial undertakings, mining ventures, &c., yielding approximately £22,000,000 per annum. In Germany the success of companies connected with iron, steel and engineering (not a few of them laid out on a much larger scale than our own) has been as great as in Great Britain. They have written off very large sums for depreciation, and at the same time added largely to the bonus and pension funds in addition to declaring excellent dividends. The direct cable between Germany and the United States referred to in our last report has been laid.

France.—The Paris Exhibition, the greatest of its kind, has brought visitors from all parts of the world. Owing to unfortunate circumstances it was not patronized by the English to the extent its promoters had anticipated, and this no doubt contributed to its disappointing financial results. It seems to us that exhibitions have had their day. It is impossible in the time at the disposal of most visitors to do more than cursorily glance at the exhibits and so lose sight of the minute details. As pleasure resorts they are too large, and from a commercial point of view we consider they fail to achieve substantial results.

Russia continues her industrial development and is seeking foreign capital, which has hitherto been principally found by French and Belgian financiers. The Chinese war has caused her to add from 30 to 50 per cent. to many import duties, thus checking trade to some extent.

Belgium.—This country has modified her import duties on iron and steel in such a way that all materials for shipbuilding purposes shall enter duty free, provided the ships built therefrom are exclusively for foreign account.

Spain is rapidly recovering from the effects of the war with America, being freed from colonial difficulties and incidental expenses connected therewith.

The United States have now had several years of unbounded prosperity. Large crops of cereals, moderate crops of cotton, with liberal prices for both, have enabled the States to develop numerous local enterprises, besides, for the first time, participating in European loans, such as our war loan, particularly the August issue of £10,000,000 Treasury bonds and the German 4 per cent. loan. In addition, their great industrial advance gradually makes their world wide competition keenly felt. The re-election of Mr. McKinley to the Presidency has caused universal satisfaction and may be taken as a confirmation that gold will be their ruling monetary standard of the future. The heavy import duties will doubtless be maintained, thus preventing

foreigners bringing in their manufactures under favorable conditions. Free trade there, as in most other countries, has made no progress. In the present year their home consumption of rails may reach 2,200,000 tons, and, with the probable increase of new lines in 1901, something like 2,800,000 tons may be laid down. The length of railway completed by December 31, 1899, amounts to 190,833 miles, and is estimated in the coming year to reach about 200,000 miles.

Mexico.—President Diaz has been re-elected and under his government we may expect the steady progress continued. Its trade will naturally favor the United States, owing to proximity by land and water. The latter remark generally holds good as regards Central American States.

China.—Owing to the war the position of affairs from a commercial standpoint is exceedingly serious. Business was done with us last year to the extent of something like £70,000,000 exports and imports combined; this year it will probably be considerably less. The present curtailed ability to export brings, as a consequence, a proportionate inability to pay for imports, furthermore the safety of the different loans issued on the security of the customs duties may be considerably impaired. This has proved a record year, in the remarkable fact that the great European Powers, with Japan and the United States, have for once joined hands in an endeavor to arrive at a united solution of the Chinese difficulty.

The Australian Colonies are making steady progress, and we suppose it will not be long before they issue their loans in the form of consols guaranteed severally by their respective Provinces, and that, under the English trustees' act, powers will be granted to invest in them as in our own consols. During the last few years they have entirely regained public confidence, while the union of all the Australian colonies into a commonwealth will give a powerful stimulus to their commerce and credit. The prospective visit of the Duke of York will further augment the strong feeling of loyalty that unites us. In association with finance it may be noted that the Australian colonies have during 50 years mined £427,000,000 worth of gold.

Canada.—The Dominion's progress is most satisfactory. The last financial year showed a very substantial surplus of revenue, which has been largely used in railway extension. She has again shown her desire to meet Great Britain most liberally by the encouragement of reciprocal business, having increased this year the discriminating duties in favor of British goods to 33 1-3 per cent. The British Pacific cable from Vancouver to Queensland and New Zealand is to be completed by the end of 1902, Her Majesty's Government and the governments of New South Wales, Victoria, Queensland and New Zealand having accepted a tender of £1,795,000.

India.—In spite of plague and famine the railways of India are progressing steadily, and each mile laid down must in some way help toward ameliorating the future effects of famine by cheapening the cost of transport of food, &c.

Africa.—The South African war appears to be closing and we repeat our views of last year, that its eventual outcome will be renewed activity there, to the advantage of our merchants and manufacturers. This and the China war will, when concluded, have cost the country about £100,000,000, approximately the same as the expenditure caused by the Crimean war, representing an annual charge of about £4,000,000 in interest and redemption, less what South Africa may contribute. Nearly all the money required for the war has been spent within the Empire, and this at least must be a cause of congratulation from a financial and commercial view. Railways in South Africa have all suffered from the effects of wear and tear, and in many cases from deliberate damage. The materials for their renewal, which we think it only fair should be ordered from home, would give an impetus to all engineering works. Loans will doubtless be issued here by Cape Colony and Natal, but only gradually as law and order are restored.

Money.—The money market has remained firm during the year, as we prognosticated, and although the tide of high prices for all kinds of goods seems to be on the turn, we nevertheless believe that we shall not, in the near future, see cheap money, in face of the heavy and continuous expenditure for the navy and army. When the extra cost of additions to the navy, and the expected improvements and alterations at the War Office, are taken into account, we estimate an annual increase of at least £10,000,000 will have to be provided.

Silver, in contradistinction to other metals, has increased in price, and toward the end of the year reached a higher figure than it has obtained for about 40 years.

Labor.—It becomes daily more evident to every country that the burning question of the time is how to secure employment for its ever growing population. The old age pension movement continues to find increasing favor abroad, whereas but little progress has been made here. If a scheme which would throw no greater financial burden upon the people than the present poor rate system does could be devised, it would make very little difference to the public if old age pensions were to take the place of poor relief, and by the transference of the financial burden from the ratepayer to the taxpayer the workingman would himself help to povide his pension. It is impossible to give too much encouragement to sound schemes that have for their object relief for the working classes. We say this from no undue feeling of sentiment, but it is obvious, even to the least liberal, that the best security offered against the disorganization and loss of trade by strikes and trade disputes of any kind is a better feeling between employer and employed on the one hand and the confidence engendered by an assured provision for old age on the other. Associated with this most important subject is the relationship between the workingmen's leaders and other classes; and it seems to us, looking at the matter from a commercial point of view, that it is very desirable for the secretaries of the chief trade unions to be members of the Chambers of Commerce, when close and constant intercourse might remove many wrong impressions and misunderstanding. There is no doubt that the iron, steel and coal trades have had a record year. As in most cases handsome profits have been made, both by individuals and limited companies, we cannot conclude our report without expressing the hope that this prosperous condition will result in an ample sum being set aside for renewal and depreciation of plant and leases, &c., which accounts often have to suffer when the financial result of a year's working has not been satisfactory. We trust that manufacturers will seize the opportunity to bring their works up to date as regards labor saving appliances, as this is the only way by which they can expect to compete successfully with our foreign rivals.

We think the prospects for trade in the coming year will be moderate in comparison to this and reduced as regards values. The latter condition, however, may create fresh demand.

National Steel Company.—We regret to state that through an oversight the name of W. P. Siebert, the general sales agent of the National Steel Company, was omitted from the list of the officers of that company in the report published in our Consolidation Supplement issued last week.

An effort is being made to combine the rubber companies of the country operated in opposition to the United States Rubber Company, and a meeting for this purpose is to be held this week in New York. There are 14 concerns manufacturing rubber goods which are independent of the rubber combine.

A Constantinople dispatch of December 25 says that a contract for the purchase of a cruiser for Turkey was signed on that day by the Minister of Marine, Hessan Pasha, and General Williams, representing the Cramps of Philadelphia.

Official statistics show that during the past year 52 vessels of all descriptions were destroyed on the lakes through fire, collision, foundering and shipwreck, including 11 steamers. Their total value was $572,000. The cargo losses were confined principally to coal and iron ore.

The Philadelphia Iron Trade.

BY THOMAS HOBSON, PHILADELPHIA.

In writing our last annual review of the Philadelphia iron trade we said that 1899 had been the most eventful year the trade had ever experienced. This might be said again in a modified form in regard to 1900, as it was unquestionably a great surprise after so much activity to meet month after month continued dullness, as well as an almost continuous shrinkage in prices. A more agreeable surprise, however, and a very great surprise, has been the extraordinary reaction during the closing months of the year, particularly during November and December. From a condition of dullness and weakness the market sprung into immediate activity, which is maintained even during these holiday times.

New Plants and Enlargements.

Perhaps no more striking evidence of the prevailing confidence can be given than by a consideration of some of the new enterprises, as well as others who have made notable extensions. Among the most important may be named that of the

Diamond State Steel Company, Wilmington, Del.,

who have completed the erection of an open hearth steel plant, consisting of five acid and basic open hearth furnaces of 50 tons each, which gives them a maximum daily capacity of 500 tons. A new blooming mill has been installed to roll the steel into billet, bloom and slab form, 4 inches square or equivalent and larger sizes. They have also made various additions to machines and improvements in their numerous shops, mills, foundry, &c., which are in the line of increasing and improving their products, but do not add any additional lines to their list of manufactures. It is probable that further additions will be made to the plant, which will fit it for making small billets below 4 inches square down to 1½ inches, and sheet bars, and will enable them to make larger sizes of finished material in rounds, squares, flats and shapes than the present mills will produce.

The next of importance is that of

The Lukens Iron & Steel Company, Coatesville, Pa.,

in which connection we may note that the site which the present mills occupy has been so used continuously for more than 90 years, and owned and operated by members of the same family from 1804 to the present time. The plant, which is one of the largest and most modern in the country, was fully illustrated and described in *The Iron Age* of July 26, 1900, but it may be said that the average increase of output is 30 per cent. more than it was a year ago, and that the universal mill is in full operation and running double turn. The company are making further extensions, and when the slabbing mill is completed they expect to still further increase their output 30 to 50 per cent. by having the stock prepared in a better shape for getting out a large tonnage.

Worth Bros. Company, Coatesville, Pa.,

have completed some very extensive improvements and additions to their plant and facilities, having within the past two years increased the open hearth department from two furnaces to six, four of which are basic and two acid. They have also more than doubled the output of their 132-inch mill by the addition of two gas heating furnaces, large and up to date in every respect. In the way of machinery they have made a number of additions within the past year, notably attaching a set of plate straightening rolls to their 132-inch train, installing two large guillotine shears and one of the largest and latest improved rotary shears thus far made. They have also installed several of the largest and most improved electric traveling cranes, as well as a plant for generating electricity for these cranes and other purposes, including lighting the works. They have at this time under construction a soaking pit of the latest and most improved design, which they anticipate will increase the output of their 132-inch mill one half. They hope to have this in operation very shortly. They have also erected a large machine shop and have it equipped with a full line of tools, such as boring mills, planers, lathes, punches, cranes and all other necessary appurtenances. At the Coatesville Rolling Mill Company department a year ago four forge fires were in operation; now they have eight. They have also erected a complete plant for the manufacture of boiler tubes, having now in successful operation a one-set mill and contracts placed for another, so that in the course of the next 30 to 60 days they expect to have in operation a two-set tube mill with all modern appliances.

The Pennsylvania Steel Company

have expended during the year not less than $1,000,000 at their Steelton plant, a large proportion of which went into their switch and frog department. They have also erected an entirely new machine shop, made large additions to their bridge shops, put in two 50-ton open hearth furnaces and a new steel casting foundry, besides new blowing engines and other improvements. The company are doing a larger business than at any former period of their history, and with their increased facilities expect to do still more during 1901.

The Pottstown Iron Company, Pottstown, Pa.,

are making some very important changes. An entirely new method of puddling will be adopted which is expected to revolutionize that branch of the trade and enable the owners of the process to re-establish a market for iron plates on an absolutely solid foundation.

The Logan Mfg. Company, Phœnixville, Pa.,

manufacturers of steel castings, are another one of the new concerns in operation during the past year. Six acres of ground were obtained by the company at the above mentioned place, adjoining branches of both the Pennsylvania and Philadelphia & Reading railroads, and a modern casting plant erected for the manufacture of steel castings by the Tropenas method. A foundry building, 100 x 150 feet, of steel and corrugated iron, was built and equipped with a 2-ton Tropenas converter, a Paxson cupola of 5 tons per hour capacity, and other modern foundry equipment. In order to meet the growing business of the company an addition 50 x 100 feet was recently made to the foundry, another 2-ton Tropenas converter and a new cupola added, larger core ovens built and electric cranes, hoists and other labor saving apparatus installed. A feature of this plant is its power, which is entirely electrical, all machines, elevators, blowers, &c., being driven by electric motors, the electric current for which is supplied by a general station.

The Pencoyd Iron Works.

Work on the foundations for the two new workshops for the Pencoyd Iron Works, at Wissahickon, is being pushed, as it is the purpose to build early in the spring. The foundations, which were found necessary owing to the marshy condition of the ground, consist of immense pyramid-like piers of concrete sunk deep in the ground. In some cases they will rise 25 feet above the water line of the Schuylkill, so as to be on a level with the street grade. The piers are formed by sinking huge caissons made of timber and filling in with concrete, which hardens in 48 hours and is then exposed to the sun and weather, the whole finally becoming like solid rock. A foundry and machine shop, each 100 x 340 feet, will be erected. They will stand parallel with Main street and are to be constructed entirely of iron and glass.

The Gruson Iron Company,

who have obtained from the Krupp Company the exclusive American rights to manufacture the Gruson turret for coast defense, have well under way several buildings on their extensive tract of land at Eddystone, 12 miles south of Philadelphia, and expect to begin manufacture in the spring. While the company were formed with a view to manufacturing the Gruson turret, they will for the present confine themselves to general machine and foundry work, including heavy castings and rolls for rolling mills. The Gruson Company have five buildings in course of construction. These will cover but a comparatively small part of the tract owned by the company, but two much larger buildings are projected. The tract is 1 mile from Chester and comprises 185 acres, bought some time ago from the estate of Thomas Simpson. The territory includes about one-third of the borough of Eddystone. There is a frontage on the Delaware of 1000 feet and a depth of 25 feet of water at the bulkhead line. The Pennsylvania, Baltimore & Ohio and Reading railroads touch the locality. The buildings now under construction are an office, 33 x 57 feet; a foundry for heavy work, 122 x 200 feet; a machine shop, 122 x 100 feet; a pattern shop, 40 x 75 feet, and a power house 45 x 90 feet. This latter will be equipped with 500 horse-power boilers and a 400 horse power Harrisburg engine. There will be installed the Crocker-Wheeler electrical equipment. Eventually the company expect to erect for the manufacture of the Gruson turret two buildings 200 x 680 feet equipped with three 100-ton cranes. It is also planned to devote one-third of the tract of land for the construction of a settlement for workmen.

The Penn Steel Casting Company, Chester, Pa.,

are enlarging their plant. The improvements will consist of the building of a large foundry and machine shops. To the present foundry, which is 400 feet long, an addition will be made 200 feet in length. In addition to the increased floor space and capacity other improvements are proposed. A smaller foundry is to be erected and two 10-ton furnaces built. Another melting furnace is being erected in the main foundry, and when completed, will make a total of three furnaces in use. The new machine shop to be erected will be on improved plans and will be equipped with the most improved machinery, including saws, lathes and planers. In both foundry additions new core ovens will be erected for drying molds.

The Seaboard Steel Casting Company, Chester, Pa.,

one of the new steel plants recently in operation, are located on the Delaware River front, where they have purchased property about 900 x 700 feet. The latter dimension, however, has been greatly extended by dumping of refuse and material from excavations into the river. Both the Pennsylvania and Philadelphia railroads enter the property and are available for shipping. The main foundry building is 560 feet long by 110 feet wide, steel framed with brick curtain walls. The machine shop is 300 x 80 feet, with an annex for a power house, which contains the boilers, engines and electrical machinery. An office and supplementary building and sheds have also been built. Two 20-ton open hearth furnaces have been built and the foundry equipped with the latest labor saving machinery. The machine shop has been equiped with the latest types of machine tools and every facility provided for the expeditious handling of work.

The Frankford Steel Company

have purchased 32½ acres of ground at Eddystone, Pa., and contemplate the erection thereon of an extensive addition to their Ellwood City, Pa., plant. This extension was more fully described in *The Iron Age* of December 20.

Pusey & Jones Company.

The Pusey & Jones Company, Wilmington, Del., have erected a new steel framed building 115 x 40 feet, the upper floors of which are to be used as a pattern shop. The lower floor will be used in connection with the shipyard for fitting up frames of vessels, &c. The office building has been enlarged and improved, the drafting room facilities increased 50 per cent. To the company's 14 acres recent additions have been made by leasing the adjoining properties, considerable wharf frontage being acquired by this move. Electric lighting system has been installed and the Webster vacuum system of steam heating adopted and installed for heating the office and shops.

The Consolidated Iron & Steel Company

are operating the Bristol Rolling Mills at Bristol, Pa., which were shut down for several years. Improvements and additions have been made, so that the capacity is 60 to 80 per cent. greater than formerly, and full time has been made almost continuously since the property passed into the new ownership.

The American Sheet Iron Company, Phillipsburg, N. J.,

also started up during the early portion of the year and have been continuously full of orders ever since. The mill had been idle for eight years, but has been so much improved and enlarged that its capacity is 50 to 60 per cent. greater than formerly.

The New York Ship Building Company, Camden, N. J.,

are another important industry in operation during the past year. Their plant, on which they have been actively engaged throughout 1900, is, at least as far as practical shipbuilding is concerned, almost finished. Minor details, some building and installation of machinery remain yet to be completed. The buildings and their equipments are modern and every facility has been used for the expeditious handling of materials. Notable features are the covered ways, by which means the building of a vessel will be practically done indoors. The New York Ship Building Company have begun active vessel construction, and will be one of the heavy consumers of steel plates and other materials in this district. The keel for the first vessel was laid early in December of last year, and the frame work is now well under way. Contracts have been taken for four vessels with 27,000 approximate registered tonnage, and at a value of over $2,000,000. Two of these are for the American Hawaiian Steamship Company for their New York and Pacific trade, and another is for the M. S. Dollard Transportation Company.

The Neafie & Levy Ship & Engine Building Company

have extended their plant during the past year by the purchase of adjoining property. Improvements to the plant and installation of new machinery have also been made. The yard has had a large amount of business during the past year, and ten vessels, with an aggregate registration of 9000 tons, are now under contract, valued at $2,000,000. The most important of these are the cruiser "Denver," and three torpedo boat destroyers for the Government, besides which several other vessels are now in course of construction.

The Tioga Foundry Company, Philadelphia, Pa.,

have completed the new addition to their foundry and are now arranging to tear out the old foundry building, and rebuild same to conform with the new building. This when completed will give them a foundry floor 160 x 50 feet. A new cupola having a capacity of 10 tons per hour has been installed in a wing 40 x 25 feet adjoining the foundry. A new Ridgway steam crane has been put in and an electric lighting system installed. These improvements enable the Tioga Foundry Company to employ 25 additional molders. Trade with this company has been exceptionally good during the past year, work on hand at the present time being alone sufficient to carry them well over into next year.

The Keystone Drop Forge Company

have increased their capacity fully 100 per cent. during the past year by the introduction of new and improved machinery. The past year has been the best in the history of the company. Additional new machinery is to be put in, most of which has already been purchased.

The Midvale Steel Company, Nicetown, Philadelphia,

have during the past year made extensive improvements to their plant and equipment. A new boiler house has been built and installed, a new open hearth plant is now under construction, and a number of other additions

have also been made. A vast amount of new machinery has been or is yet to be placed in position, and further extensions and improvements to their machine shops are contemplated. It is probable that more than $1,000,000 has been expended by the Midvale Steel Company for improvements during the past year.

Hoopes & Townsend, Philadelphia, Pa.,

manufacturers of bolts, nuts, rivets, washers, &c., have begun the construction of a large rolling mill for the manufacture of their own raw material at Fort Washington, Montgomery County, Pa. The site is within a short distance of Philadelphia, on the Reading Railroad, and has excellent water and railroad facilities. The entire plant will eventually be removed, but at present it is the intention to begin the construction of a large rolling mill for the manufacture of their own raw material. The buildings are to be large and designed to accommodate increasing business. All the buildings are to be fire proof. Some dwellings will be erected, but only such as are required for immediate use. Hoopes & Townsend now employ 800 men, and they will add 200 more on the completion of the new rolling mill.

The Reading Iron Company

of Reading, Pa., have expended upward of $1,000,000 on their various plants during the past year. This includes new open hearth steel plant, new pipe mills, and various other additions and improvements, which will enable them to greatly enlarge their output, besides economizing in the cost of production.

From the above it will be seen that while the manufacturing interests in Eastern Pennsylvania and adjoining districts are making substantial progress, the notable feature is in their variety of character which has been developed as the result of changed and changing conditions. The supremacy in pig iron has passed away and there is to some extent a comparative shrinkage in rolled material. Local industries, however, have been built up to an extent which will challenge comparison with any section in the entire country. This is specially notable in shipbuilding, an industry which bids fair to be of enormous magnitude in the course of a few years, and which at the present time has in the Delaware yards alone over $35,000,000 in contracts on the books, while Baltimore, Sparrow's Point and Newport News could also count millions of dollars' worth of work on their books. If it be true (and there is no room for doubt in regard to the matter) that we have cheaper material and more highly skilled labor than any other country has, why should we not be competitors for the world's trade in shipbuilding? Practically the United States is already in the field, and in years to come the Clyde, the Tees, the Tyne, Belfast and the Continental shipyards will be fully aware of that fact. This great industry naturally brings others in its train. Plates, shapes, forgings, castings, bolts, rivets, engines and other equipment must be within easy reach, and the extent to which this demand is going to be met has been indicated in our previous remarks. Then again, armor plate and ordnance of all kinds will be required, and in this branch alone in Philadelphia and at nearby points millions of money is being expended. The locomotive works, with upward of 8000 hands (and still growing), are supplying almost every country in the world with motive power. Bridges and structures from the Steelton, the Phœnixville and the Pencoyd shops are to be found in almost every land on the face of the earth, and as the world progresses so will the demand for this class of work progress also. The East may not show as much progress in blast furnace or rolling mill work as certain other districts, yet in the Philadelphia district there are some of the best equipped mills in the entire country. Their geographical position enables them to handle the export trade in an exceptionally favorable manner, while they may be said to be on the spot as regards the vast and increasing industries which cluster around the city of "Brotherly Love." There is therefore no reason yet for any misgivings in regard to the Eastern districts. Conditions are rapidly changing, but how wisely and how well manufacturers are adapting themselves to these changes will be more apparent in a few years than they are now.

The Markets in 1900.

Pig Iron.

Business in this department during 1900 cannot be regarded as having been satisfactory. The entire situation so far as that is concerned may be stated in a very few words—high costs and rapidly declining prices for the material sold. The extraordinarily good season experienced during 1899 probably prevented disasters during 1900, but the storm has been outridden, and the trade are again in smooth water, with every appearance of safe sailing for a long time to come. The features of the most striking importance were the rapid decline in prices during the first half of the year and the rapid decrease in production during the last half. Prices of pig iron declined during the first six months easily $7 per ton, while production during the last six months, say from June to December, decreased 80,000 tons per week. This is a very suggestive feature, showing as it does how closely the price regulates the supply. The fact appears to be established that over $20 for pig iron leads to excessive supplies, while $10 to $12 is too little to bring out sufficient business. It may be assumed, therefore, that somewhere between these extreme figures will be necessary to bring out adequate supplies, and from present appearances to-day's prices are not likely to be changed very much for a long time to come. Contingencies may arise to upset any or all calculations; but with such data as there is to work on it seems a fairly safe prediction that $2 higher or $2 lower is about the extreme at both ends. It is true that the facilities for production are steadily increasing, but it is equally true that not only is there a great increase in consumption along the old lines, but there are new fields and new lines which have made and will continue to make much heavier calls for furnace products than was ever thought of two or three years ago. The use of steel for car building is an important item, the export demand for rails now easily averages 1000 tons per day, and with these go cars, locomotives, bridges and other equipments, without figuring on pig iron and finished material in all its various forms. In one way or another 1,000,000 tons per year for exports is a safe basis to figure on, with almost unlimited possibilities for increase. The home trade, however, is our stronghold, and prospects for a long time to come appear to be phenomenally bright. For these and other reasons it may therefore be assumed that prices are not liable to change much during the coming year. The large interests are not favoring high figures, and they are probably strong enough to so control supplies that they will not permit any appreciable decline, unless something entirely unforeseen intervenes. At this time we are on the basis of 1,000,000 tons per month of production. It is not likely to decrease, but may be increased 10 to 15 per cent. more during the next two or three months, with a good reserve capacity behind that if it becomes necessary to use it. Some remodeling and improving of furnaces has been done in this district, but only two entirely new furnaces are being built, one at the Warwick Iron & Steel Company, at Pottstown, and one by Mr. Wharton, at Port Oram, N. J. These are to be model furnaces in every respect, and are each expected to turn out about 2000 tons per week. The record as regards the prices of pig iron was almost continuously downward during the first three-quarters of the year. Taking No. 2 X Foundry as a basis, the opening price in January was $23.50, at the close about 50 cents less. A further drop of 50 cents was made during February, bringing the price to $22.50. During March the market was extremely dull and weak, the price of No. 2 X having dropped to $21.75. April brought a further decline to $21, while May brought it to $20. June was a bad month, and records a drop to $19; July was even worse, and made a record of $16.25; August to $16, and September to $15.50. October recorded the lowest prices of the entire year, $14.75 to $15 having been done for that grade of iron. November showed decided strength and activity, and a recovery to $15.75. December closing at a trifle above that figure, although, as usual at the close of the year, there is some little dullness, and in a few instances a willingness to enter orders for spring delivery at a trifling rebate from the highest figures.

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Billets.

Prices of billets have had a big drop since last year at this time; in round numbers $16 per ton. Billets are less of a factor than they were during the five years preceding 1900, and will probably be still less so during the coming year. Many of the old time billet consumers in the East are now billet makers, so that purchases in the open market are of comparatively little importance. The highest price for Eastern delivery during the year was $38 in January down to $27 at the end of June, and the lowest $19 to $20 in July and August. Since the new deal was made by the billet makers $21 has been the figure for Eastern delivery, and that price seems likely to stand indefinitely, as for reasons mentioned there are not many buyers now.

Finished Material.

The volume of business was much below that of 1899, the main shrinkage being during the late spring and summer months. The financial results of the year's business cannot have been very satisfactory either, as during a considerable period it was high cost of production and low selling prices, the former being a legacy from the previous year. During September and October things began to shape themselves better, as crude materials got down to low figures, while selling prices improved a little and have continued to do so until the present date. The advance from the lowest, however, is not more than $6 per ton in bar iron and $7 to $8 in plates, the latter being due to a new working arrangement in which are included all the plate mills in the country. The decline in both bars and plates would probably have been greater than it was but for a very heavy foreign demand which came in most opportunely, and in some cases unquestionably prevented serious embarrassment. During the last quarter of the year, however, the home trade has picked up remarkably and the mills have now a full line of orders on their books, with prospects of taking in as much more whenever they are likely to need it. The demand since election has been a great surprise; everybody expected improvement, but the extent which it has assumed and prospects of its continuance are beyond all anticipations. There may be a little falling off during the next few weeks, but there is enough sure business in sight to allay any anxiety in regard to the final outcome. Not much dependence is being placed upon the foreign demand at present, but it will be here again after a while, and in the meantime we can afford to wait. The drop in prices from last year at this time looks very formidable, but things are evening up, and with the new basis of costs manufacturers are beginning to see their way toward a fair margin of profit. The declines were as follows:

	Ordinary ¼-inch plates. Cents.	Refined bar iron. Cents.
January	2.50 to 2.40	2.20 to ...
February	2.40 to 2.25	2.20 to ...
March	2.10 to 2.05	2.20 to 2.15
April	2.05 to 2.00	2.10 to 2.15
May	2.00 to 1.85	1.85 to 1.75
June	1.65 to 1.60	1.70 to 1.60
July	1.50 to 1.35	1.50 to 1.30
August	1.35 to 1.30	1.30 to 1.35
September	1.30 to 1.35	1.30 to 1.35
October	1.25 to 1.30	1.30 to 1.35
November	1.25 to 1.30	1.25 to 1.30
December	1.55 to 1.60	1.45 to 1.55

Old Material.

The trade in old material was immense during the past year, the increased supply being due to the installation of new trackage by the railways and by renewals made in almost all lines of business. Prices had some extraordinary fluctuations during the first half of the year, steel rails having dropped from $25 in January to about $12 in July. Railway scrap also had a drop of from $25 to about $13, turnings from $16 to $8, borings from $14 to $6.50, and so on in proportion through the entire line. The lowest point appears to have been reached in August, but there was not much recovery until November, when the entire market assumed a stronger tone, which was maintained until about the middle of December, when prices became somewhat easier, particularly for steel stock, steel rails having declined from $17 to $15.75. On the other hand, railway scrap has recovered from $13 to $18, turnings from $8 to $10.50 and borings from $6.50 to $8, with a pretty stronge undertone through the entire list.

The Machinery Trade in 1900.

In reviewing the year which has just rolled by we must look back upon a period that was fraught with much of interest to the machinery trade; a year that was alive with interesting situations and abounded with trying problems, some of which were solved and others which remain for the future to unravel. But there is one crowning feature of the situation that stands out in bold relief. It is the stability which has been maintained throughout all; the calm steadiness and conservatism which prevailed right through that most trying ordeal of bringing the market back to a normal footing from the inflated boom, the afterclap of which the year previous had left to be dealt with.

When the year 1900 dawned the market held a position which sometimes forecasts misfortune and generally is productive of extreme apprehension. The boom of the year previous had run its course, prices, of raw materials at least, were at top notch and every one expected to see things topple, with the usually attending disaster.

During the rushing times production had increased materially, numerous small concerns had sprung into existence and were building cheap copies of the standard tools. There was every reason to fear an overproduction, with the little fellows cutting prices in order to dispose of their product. Everything was rife for a quick slide in the wrong direction. Instead, however, values receded slowly and naturally, there was no crash, and to-day finds values in no wise demoralized but rather steady and the market in good condition for the promising future.

It is a rather difficult matter to gauge the course of the machinery market, as a whole, as to prices, because of the lack of uniformity in the product of the various builders. In machine tools, for instance, there are several high class specialties which maintain their price despite the fluctuation of the general market. Builders of such tools did not advance their prices during the boom and consequently did not reduce them during the year under review. The other class of ordinary tools advanced something like 15 per cent. during 1899 and the year following values receded only about 5 per cent. Some builders may have reduced prices a little more than this and other made no change whatever. Another condition which presented itself and had some effect on the course of prices arose through the alertness of the large machinery merchants. Anticipating the rush, they purchased heavily of the standard tools at prices considerably below the top figure. Many of these tools they disposed of without putting up prices, and after the rush of orders subsided they continued to sell at the same figures. This aided in keeping the market steady.

While the year was not an extraordinary one for the consummation of large transactions, there were a few which attracted considerable interest. Several large projects which came up during the year have been held over to be closed at some time during the new century. The Government has been a good customer throughout the year, and besides the heavy purchases for equipping new buildings and adding to the existing shops at the various navy yards the Ordnance Department were in evidence. The lot of tools secured by this department for the Springfield Arsenal was a good one, and the tools which still remain to be purchased for the Rock Island Arsenal rank with the largest deals that came up during the year.

The Foreign Situation.

During the year the foreign situation assumed a grave aspect. Business from Germany fell off to a marked degree and other Continental European countries shared the slump. England, too, presented evidence that her period of extreme activity had come to an abrupt termination. And now the European repre-

sentatives of American machine tool builders are crying aloud for lower prices. They are urging the American builders to sacrifice as much as possible in order to hold the European trade, which is fast slipping from their grasp. The time has arrived when the large European builders have attained a a formidable position as competitors of the American tools, and through the wide difference in price are able to make rapid headway. So strong is this competition that those European concerns who have heretofore depended entirely upon their American connections are now being forced to also handle the European tools in order to hold their customers. The American representatives in England are also having a hard time of it. The prices of the American tools which they handle are so much higher than those quoted by the Continental European builders that the struggle is very much in favor of the latter. A point that should be kept in view is that the European builders copy none but the very best and highest priced American tools. Just at present the machine tool business in England is very poor. It has been on the wane throughout the entire year. As England is dependent on Continental conditions to so great an extent it cannot be hoped for that business in England will improve before the conditions on the Continent undergo a change. The war in South Africa and the Chinese trouble are also given as causes for England's poor condition. It is also said that the Paris Exposition has not only shown business in Europe to be poor, but has actually injured business. Shortly before the opening of the exposition prospective purchasers waited to see what new machines or features of construction would be exhibited. By the time that the show was going full blast and the European manufacturers saw the machines displayed business conditions had grown worse and the orders were never placed. At the close of the exposition many of the tools had to be disposed of at a sacrifice by the exhibitors, as they did not wish to bring them back to this country.

The locomotive shops in England are said to have been busy and they placed some pretty good orders for American machinery. In engines and boilers business was but fairly good. The shipbuilding trade was not overprosperous, owing to the poor prices and wide fluctuations of plates and raw materials. In estimating the shipbuilders were forced to do a good deal of guessing.

The immediate future of the European business does not loom up as an especially bright specter. Conditions are intrinsically poor. The present comparison in American and European prices does not argue very favorably in favor of the American machines, and then the very fact of the buoyancy of feeling prevalent in this country does not indicate that the American manufacturers will go out of their way very far in order to meet the European competition, as domestic business is more lucrative.

The Engine Business.

In order to speak of the condition of the engine business of this country it will be necessary to divide it into two distinct classes. One class includes the heavy Corliss and street railway types, and the other the smaller and high speed types. In the former class trade has been magnificent. Shops have been running overtime and have added to their productive capacity. Besides an excellent demand from the domestic trade some large export orders have been filled by American builders. Some of the large concerns have been compelled to virtually withdraw from the market recently on account of the long deliveries which they were obliged to name. Shops are filled in some instances well toward the second quarter of this year. Prices have naturally been very firm.

With the high speed engine builders the year has not dealt so generously. Competition has been pretty keen and consequently prices were not so firm. During the summer months and shortly before the election several of the builders reduced prices and in case of a tight pinch concessions were made on all sides. Nevertheless in summing up the entire year's business it could not be said that the high-speed engine builders had a really bad year, for the volume of business was large.

Boiler trade was active, although there were no especially large deals. Prices were firm.

In power transmitting machines the year opened up in most splendid fashion, but the last half found the manufacturers looking about for business and cutting prices. As a result of the latter condition the shafting association was dissolved and there has since been an open market, with prices ruling on a lower level than before. Early in the year the large concerns were so busy on contracts made in 1899 that the small promiscuous trade went a-begging.

Valve manufacturers have been very busy and prices have been maintained. The latter fact may in a measure be attributed to the back yard agreement which the prominent manufacturers make periodically.

Steam specialties were in good demand, but prices were not kept up to the high level attained the year previous. The various plants had been added to considerably and the production kept apace with the demand at all times throughout the year. The activity in shipbuilding and locomotive building plants has occasioned considerable demand for steam specialties, high pressure valves and steam fittings.

Speaking of activity in locomotive building brings to mind the fact that all branches of the machinery trade were benefited by the activity in this quarter. The tremendous orders placed with the locomotive builders both by the American roads and those located abroad have kept the plants running night and day. They have all expanded considerably also and have thus been good customers in the machinery section. The demand has been chiefly in heavy engines, and it is said that the large shops are all filled up to next September with orders. The tremendous activity in this line has doubtless been largely occasioned by the adoption of large locomotives by the large freight hauling systems. The cheap freight rates have made it desirable for the roads to put on heavier trains composed of cars of large capacity, and necessarily large locomotives. It is purely a method of economy.

The equipment of the heavy trains with air brakes has also been the source of considerable business during the year. Besides the increased activity in the manufacture of air brakes, builders of air compressors have also been benefited. Numerous plants have been built along the various routes to be used as testing stations, all of which required the installation of air compressors. Several roads have adopted systems of cleaning their cars by means of compressed air and this has further increased the demand for compressors. The wide use of pneumatic tools, which the year of 1899 has advanced considerably, has also been of much benefit to the builders of compressors. That the pneumatic tool business has figured most prominently in the year's activity is evident. Builders of the tools have added materially to their productive capacity and have thus figured as good customers to the machine tool trade. They have also made extensive arrangements for the introduction of their product abroad, in some instances plants having been erected in Europe for the manufacture of the tools. Among the chief uses of pneumatic tools the shipbuilders have been most prominent. The large establishments in this country have adopted them freely and the great European shipyards have also installed them extensively. The Russian Government, it will be recalled, placed an order with an American concern for $300,000 worth of hammers, drills, riveters, &c. Pneumatic tools have also been employed extensively in the building of gas holders, in bridge building, and in other forms of structural engineering.

In fine tools, cutters, gauges, calipers, &c., trade has been excellent during the latter half of the year. One concern readjusted their list, lowering the price of certain tools about 5 per cent.

Business in hoisting and conveying machinery has been active during the entire year. The larger lines of heavy special machiery, such as is used in mining plants and large coaling stations, have experienced an unprecedented demand from abroad. In the ordinary conveying plants, such as are used for the handling of ashes and coal, grain and general merchandise at storehouses, there has been an excellent domestic business.

The electric traveling crane business was good, and it

is said that prices were maintained fairly well. The year witnessed the advent of another large interest in this line. It was the new crane department of the Niles-Bement-Pond Company. During the year there was considerable talk of consolidating the various plants building cranes and similar machinery, but although the promoters went as far as securing options on the plants, nothing came of the negotiations.

Speaking of the Niles-Bement-Pond Company calls to mind an important incident in the machine tool trade. It is the absorption of the Pratt & Whitney Company by the former concern.

The Lake Superior Copper Industry.

BY HORACE J. STEVENS.

HOUGHTON, MICH., December 29, 1900.—Viewed from every material standpoint, the year 1900 has been the most prosperous ever known in the Lake Superior copper industry. The production of metal has been practically the same as last year, but earnings have been larger, owing to the maintenance of a uniformly high price for the product of the mines. The number of men employed in the mines was never before so great as during this year, and wages are higher than for a generation past. More millions have been spent in betterments than have ever been so invested in any single twelvemonth before, and the prosperity of the mines has not been confined to the shareholders, but has been generously divided with labor.

The Keweenawan copper bearing beds of igneous rock stretch from the eastern end of Keweenaw Point through Northern Wisconsin into Minnesota, but the portion of this territory in which active mining is now in progress is about 80 miles in length, from the Washington mine on the east to the Victoria mine, lying just west of the Ontonagon River. The eastern end of the active district is in Keweenaw County and the western portion in Ontonagon County, but the central and more important part of the district is in Houghton County. There was no mining for some years in either of the outlying counties until exploratory work was stimulated and the reopening of old mines brought about by the copper boom which began in 1898. At present there are three active properties in Keweenaw County and four in Ontonagon County. In Houghton County, where there were but eight companies engaged in mining after the absorption of the Tamarack Junior and Kearsarge mines by the Osceola Consolidated in 1897, there are now 20 corporations working, and of these the Franklin are operating two and the Osceola three separate mines. The production of refined copper by Lake Superior mines has been as follows for the past four years:

Year.	Ingot copper. Pounds.	Year.	Ingot copper. Pounds.
1896	142,057,500	1898	147,965,738
1897	142,702,586	1899	146,950,338

These figures show a falling off of 1,015,400 pounds in 1899. The production of 1900 will not be officially known until the middle of next year, but will show very little change from 1899, with perhaps more likelyhood of a slight decrease than of an increase. The lack of increase in production, notwithstanding the vast amount of new work under way for the past two years, may appear strange, without an explanation. There is no other mining field in the world where so much money and so great a length of time is required for the opening of a new mine as in this district. The experience of the new mines has shown that three years' time and $500,000 in cash are the minimum requirements for developing new properties into producing mines. Despite its importance as one of the four mining districts which together supply four-fifths of the world's copper, the Lake Superior field is essentially a low grade district. The richest mine here, the Calumet & Hecla, carries a trifle less than 3½ per cent. ingot copper in its rock, while the Atlantic, at the other end of the list, has paid profits crowding the million mark from rock returning an average of only two-thirds to three-fourths of 1 per cent. ingot. The great production and enormous profits of the lake copper mines are rendered possible only by the existence of regular stratified copper bearing beds of great width and enormous length. The development of such metalliferous deposits requires princely fortunes for each new mine, and it will be nearly two years more before the influence of the outputs of the new mines is plainly apparent in the figures of production of the district as a whole.

Of the 1900 output of copper the following named mines have furnished approximately these quantities:

Mine.	Ingot copper. Pounds.	Mine.	Ingot copper. Pounds.
Calumet & Hecla	85,000,000	Atlantic	5,000,000
Tamarack	20,000,000	Wolverine	5,000,000
Quincy	15,000,000	Franklin	4,000,000
Osceola	12,000,000	Baltic	2,000,000

Of the producers listed in the foregoing table, the Baltic is the only new mine. The Arcadian, Arnold and Centennial are also producing, but to a smaller extent, and not sufficiently to greatly increase the total output of the district. The Franklin, which lost two-thirds of the year 1899 by reason of the burning of its mill late in 1898, has been a steady producer again during 1900.

The present status of the mines of the district, beginning at the east and ending with the Victoria, west of the Ontonagon River, is as follows:

A few miners are doing exploratory work on the Washington property, east of Mosquito Lake, Keweenaw County.

The Arnold mine, at Copper Falls, Keweenaw County, has been working about 200 men and making 60 to 75 tons of mineral (crude copper) per month, but has recently reduced forces, and will devote more attention to the old Copper Falls mine, now a part of the Arnold territory, for the future. The Copper Falls was a dividend payer in the early days of Lake Superior mining.

The Ashbed, Humboldt and Meadow properties opened on the ashbed lode, west of the Arnold, are all idle at present, though some work was done on them last spring and summer.

The Phœnix Consolidated Company are reopening the old St. Clair mine and also devoting a little attention to the Robbins, or West Vein. The Phœnix has been a badly mismanaged mine during much of its past history, this being palpably shown by the fact that a previous management actually lost money on cutting up and hoisting a mass of native copper weighing 563 tons—the largest mass of pure metal ever found anywhere. The mine is now under the Stanton management, which has been signally successful with the Atlantic and Wolverine properties, and which is now developing the Baltic and Mohawk, two new mines of much promise.

The Mohawk mine, opened on the northern extension of the Kearsarge amygdaloid, a cupriferous bed that has proved highly profitable at the Kearsarge and Wolverine mines, next south, will build a mill on Traverse Bay, Lake Superior, next season. A railroad between the mine and mill site is practically completed. This mine is notable for the existence of a new mineral, mohawkite, found in a fissure vein crossing the stratified formation at approximately right angles. Mohawkite is a double arsenide of copper and nickel, carrying about 2 per cent. cobalt and traces of iron. Two 60-ton cargoes of mohawkite have been shipped to Swansea, Wales, for smelting, there being no American smelter equipped to safely handle the arsenical material.

The Wolverine may build a mill adjoining that of the Mohawk next year. At present it is running one stamp at the mine and one head at the old mill of the Allouez. The Wolverine has come to the front remarkably during 1900 as a dividend payer.

At the Allouez a few men are doing exploratory work underground.

The Centennial has permanently dropped work on the conglomerate, which has cost about $1,500,000 in the past without securing a profitable mine, and is at present opening two shafts on the Kearsarge lode. The showing is good, and an assessment of $500,000 was recently levied to provide funds for the opening and equipping of a large mine on this lode, and to construct a stamp mill opposite those of the Calumet & Hecla, on Torch Lake. The Centennial has an old mill with a

single stamp at the mine which is now treating about 200 tons of rock per diem, from the Kearsarge lode.

The Calumet & Hecla has recently stopped work at four of its five shafts on the Osceola amygdaloid. This suspension is due to inability to secure delivery of machinery when promised, and lack of milling facilities to treat rock from these shafts before the completion of the new amygdaloid mill at Lake Linden. It is not likely that much work will be done at these shafts before 1902. Work at the Calumet & Hecla proper, on the conglomerate, continues with unabated vigor.

The Tamarack has just bottomed its No. 5 shaft, the greatest undertaking of the sort ever begun. When the first sod was turned for this shaft, on August 7, 1895, Captain W. E. Parnall, superintendent of the mine, stated that he expected to cut the Calumet conglomerate about January 1, 1901, at a depth of approximately 4665 feet. The lode was cut on December 20, 1900, at a depth of 4657 feet—11 days sooner and at 8 feet less depth than Captain Parnall's estimate. As there were no diamond drill borings and the shaft was sunk in virgin ground, the exact verification of the preliminary estimates of time and depth are certainly remarkable. This shaft will eventually add about 50 per cent. to the productive capacity of the mine, but will not be in full commission until well toward the end of 1901.

The Osceola Consolidated Company own and work the Osceola, Tamarack, Junior, and Kearsarge mines, and are opening a new mine, known as the South Kearsarge, between the Centennial and Wolverine, which gives promise of making a fine producer.

The Mayflower is continuing explorations near the Eastern Sandstone, and has several lodes showing more or less copper.

The Old Colony has driven a tunnel a quarter of a mile west from the eastern, or underlying, sandstone, through the trap formation, and will continue this tunnel for more than a half mile further. Several amygdaloids and one conglomerate carrying copper have been cut by the tunnel, which is the most ambitious enterprise of the sort ever undertaken in this district.

The Oneco has suspended work for the winter. A single shaft was sunk some depth on an amygdaloid thought by the management to be the Kearsarge, but probably an unidentified bed outcropping east of the Kearsarge.

The Tecumseh, next south of the Osceola, is continuing exploratory work.

The Rhode Island is opening on the Pewabic amygdaloid and paying some attention to two other parallel lodes.

The Franklin, Junior, has abandoned one shaft on the Pewabic amygdaloid and is reopening the old workings of the Albany & Boston, or Peninsula mine, on the Allouez conglomerate, where some good rock has been found of late. At the Franklin mine the work of "scramming" still continues, and it will be several years before the old mine is completely gutted of its stamp rock.

The Arcadian is producing from shafts on the Isle Royale on Portage lode, and is opening two new shafts on the Mesnard epidote, a thin but apparently rich epidotal amygdaloid lying west of the Isle Royale and Portage beds.

The Quincy has recently completed a new mill of three stamps, one head of which was started early this month, with a second to go into commission immediately. A vast amount of underground opening work and surface construction and equipment, has been done at the Quincy in the past twelve months, and the mine will make a much larger production in 1901 than ever before in its history.

The Isle Royale Consolidated will have their new mill running next summer. This property has produced about 18,000 tons of copper in the past, made at a loss, owing to lack of capital and poor mining and milling facilities, but gives promise of becoming a fine mine, under modern methods and management. The Isle Royale had $2,000,000 in cash for development, after the acquisition of its three mines, and adjoining mineral lands.

The Atlantic has added new and powerful machinery during the year, and is again in the ranks of the dividend-paying mines. It is now employing upward of 700 men and is equipped much better than ever before in its history.

The Baltic is now making about 100 tons of ingot copper monthly, with two heads at the Atlantic mill. A new four-stamp mill is being built opposite the Atlantic mill for the Baltic and will go into commission next season. The Baltic is more than earning expenses from its leased stamps and is a mine of great promise.

The Trimountain, next south of the Baltic and opened on the same lode, has one of the finest showings ever secured in this district for an equal amount of work. An assessment of $500,000 was recently levied on the stock of this mine, to furnish equipment and build a new mill. The mill site, 2 miles west of the Baltic's new mill, is now being cleared and construction will start early in the spring.

The Champion mine of the Copper Range Company lies next south of the Trimountain, and is also opened on the Baltic lode. The showing is fully as good as at the Trimountain, and possibly better. This mine will have a mill opposite that of the Trimountain, and will get the use of one, and perhaps of two stamps at the Atlantic mill as soon as the Baltic drops their use.

The Elm River has been exploring its ground very thoroughly, with rather indifferent results until very lately, when a new amygdaloid, which appears to be richer, wider and more regular than those first opened, has been cut. The future of the property apparently hinges on the developments in this amygdaloid during the next few months.

The Wyandot, next south, has also been exploring a great deal of ground with poor results, but has opened a new lode recently from which better things are hoped.

The Winona, next south and east, has proved disappointing. Originally opened with one shaft a third of a century ago, it was thought by all mining men to be a property of exceptional promise, but was not developed until recently because of lack of a railroad. Work under the present management, begun two years ago, gave a fine showing at first, but the formation was much disturbed and prospects eventually became very blue until the latter half of 1900, when a marked improvement was noted and has since continued. Spirits of the shareholders were nearly at the zero point, but are gradually rising with continued reports of better indications.

The Adventure Consolidated comprises three old mines—the Adventure, Knowlton and Hilton—and is famous for its silver. Developments are of a satisfactory nature and a mill will probably be decided on next year.

The Mass Consolidated, next southeast of the Adventure, comprises the old Mass, Ridge, Hazard, Ogima and Merrimac mines, work at present being confined to the Ridge. This property was a dividend payer many years ago and is favorably regarded. A new two-stamp mill is building at Ogima, on Keweenaw Bay, and should be running by the middle of 1901. The Mass has marketed about 100 tons of heavy copper, secured from opening work alone.

The Michigan mine is opened on the Calico lode, paralleling the contact vein of the old Minnesota, which returned dividends of $1,820,000 between 1854 and 1876, practically all of which was paid before 1866. The Michigan shafts will be used to drain the old Minnesota mine, which will be thoroughly explored. There is every reason to believe that the old Minnesota contains millions of dollars' worth of copper which can be obtained at a handsome profit.

The Victoria mine, the westernmost active property of the district, is working very economically and has recently made two shipments of mass and barrel copper secured in cutting down old shafts, reopening adits and levels and breaking new openings.

The dividend disbursements of Lake Superior copper mines have been as follows for the past ten years:

Year.	Dividends.	Year.	Dividends.
1891	$3,540,000	1896	$3,985,000
1892	3,260,000	1897	5,431,000
1893	3,520,000	1898	6,853,000
1894	2,380,000	1899	12,318,000
1895	3,280,000	1900	9,798,000

In explanation of the decrease in dividends for 1900 from the high water figures of the preceding year it should be stated that the Calumet & Hecla paid dividends of $10,000,000 in the calendar year 1899, though only $8,000,000 has ever been paid by that company during any of its fiscal years, and the dividends of that company for 1900 are $1,000,000 less than they would have been but for a disastrous fire in the mine last May. The dividend disbursements of 1900 by lake copper mines other than the Calumet & Hecla are much the largest ever known.

The profits returned to shareholders by the copper mines of Lake Superior, to the close of the nineteenth century, have been as follows:

Mine.	Dividends.	Mine.	Dividends.
Atlantic	$860,000	Pewabic	$1,000,000
Cliff	2,518,620	Phœnix	20,000
Central	1,970,000	Quincy	12,320,000
Copper Falls	100,000	Ridge	100,000
Calumet & Hecla	72,850,000	Tamarack	7,290,000
Franklin	1,240,000	Wolverine	510,000
Minnesota	1,820,000		
National	320,000	Total	$106,731,120
Osceola (including Kearsarge)	3,812,500		

This is a showing equalled by few mining fields in the world. Of the total profits returned to shareholders the Calumet & Hecla has furnished 68 per cent., the Quincy, 11 per cent., and the Tamarack 7 per cent. These three mines have made almost 87 per cent. of the total profits disbursed by lake copper mines.

Estimating the market value of the 1900 production of lake copper at $25,000,000, which is a colse approximation to the actual figures, the lake mines have produced copper, during the nineteenth century, to the value of $414,117,304. The dividends from this production amount to a fraction more than 25 per cent. of the gross value of the output.

The 28 leading copper mining companies of the district had 20,984 shareholders of record on December 31, 1899, the Calumet & Hecla leading with more than 3000 stockholders.

Pacific Coast News.

SAN FRANCISCO, CAL., December 17, 1900.—We are still anxiously awaiting the result of the case before the Interstate Commerce Commission, because it will when rendered begin to exert its influence for good, and all on the currents of trade in this direction. But no indication has been had as yet and it may be a long time before a decision is finally given. But that will give Pacific Coast jobbers an opportunity to make themselves independent of all methods of transportation except those afforded by the sea. We are now getting an object lesson in self dependence. During the week the "Sierra" took out for the Antipodes a cargo valued at over $300,000, for Australia, New Zealand and the Pacific Islands. This was about twice the size of any cargo ever dispatched thither. The "Sierra" is a 6000-ton vessel, up to date in everything and her, for this trade, immense cargo shows what modern ships and appliances will do in building up our trade. Even larger vessels making the trip in 40 days from Atlantic ports will before any decision will possibly be rendered, completely revolutionize our trade with the East. It will affect other people than Middle West jobbers, and will stir up the dry bones of trade to an amazing extent. In the use of large and powerful steamships in her sea-borne trade San Francisco has entered on a new era, and the result of the change can hardly as yet be foreseen.

We have here been treated to some peculiar weather for San Francisco—an incipient hurricane and an old-fashioned thunder storm, though, happily, not of long continuance. It extended over the State. This has interfered somewhat with agricultural operations, though happily not to any great extent, and the outlook for the coming year, as far as appearances go, could hardly be better. A very large breadth of land has been or is being planted. This means under ordinary circumstances very large crops of all descriptions, and were prices any way satisfactory this would mean an exceptionally prosperous year. But even at present low prices of wheat a very good year for trade may be anticipated and for the past three or four weeks Clearing House exchanges have been in excess of those for the same time in 1899. The year just closing shows a very much larger trade than that of its predecessor, although the latter year was one of the best in the last decade.

The development of the hardware and metal trades depends principally of course on the increase in the home demand and the extension of the home markets. The latter will be materially promoted by the facilities afforded by the new steamer connections with the Atlantic coast, but the growth of the trade in other directions is a matter of great interest. The extension of the Alaskan gold fields will open up an outlet for a great deal of hardware, iron and steel, and new and promising placer deposits are being discovered from time to time. The latest of these is at the new mining town of Teller, in Northwestern Alaska. The districts tributary to it are Koogrock and Bluestone. The district already partially prospected covers a distance of 130 miles. In one instance two men cleaned up $1200 in seven hours. There has been a stampede from Nome to this place and as soon as navigation opens next year there will be a great rush thither from all parts of the coast.

Then the new lines of steamships from San Francisco south are opening up business with a score of points between San Francisco and Cape Horn, where the foundations of a great future trade should be laid. But at the present very little has been done in that way, most of the trade consisting of shipments of flour, wheat, lumber, wine and canned goods. The only article sold by the Hardware trade of which any large shipments have been made has been cordage. I refer here to the new trade, as for over 40 years considerable supplies of hardware, iron, &c., have been distributed from this city to points in Mexico and Central America. There is an opening here for enterprise in these lines to distinguish itself. I have no doubt that the manufacturers and jobbers of this city will in due time exploit this trade as far as it can be done. But Europe and the East have had hold of it for a long time, and it will not be given up without a struggle. Steamship communication with the outer world will start up hundreds of new settlements along these thousands of miles of coast. And the extent of its future trade may be barely imagined. The export trade to the hundreds of groups of islands of the Pacific will be an immense business in itself. A new start here has been already made by the inauguration of steam communication by the "Australia," a large steamer formerly in the Hawaiian trade, which now makes regular trips to Tahiti.

J. O. L.

Gear Wheel Transmission.—James Christie presented a paper before the Engineers' Club of Philadelphia, upon the special subject of "High Speed Toothed Gearing." With the aid of blue print illustrations he described four cases in which toothed gearing had recently been used to transmit power with high pressure per unit of tooth contact at a high peripheral speed. Data were given for the sizes and speed of the wheels and the composition of the steel of which they were made. The advantages of the involute over the cycloidal curves for the profile of gear teeth were mentioned, and the desirability of adopting a uniform angle of obliquity for involute teeth was pointed out. Wilfred Lewis followed with a communication upon "Interchangeable Gearing." The practical fallacy of the claim for superiority made by some writers on behalf of cycloidal over involute teeth was pointed out, and the question of the most desirable angle of obliquity to use for interchangeable involute teeth was fully discussed. Mr. Lewis recommended 22½ degrees as a convenient angle to adopt and one that could be used for a pinion of 12 teeth without perceptible interference. He suggested that the club might initiate some action by which standard proportions for interchangeable gearing could be generally adopted.

The Lake Iron Ore Industry.

BY DWIGHT E. WOODBRIDGE, DULUTH, MINN.

In the past year the changes in the iron mining industry of the Lake Superior region that had been under way for some time have been continued and emphasized and the revolutionary differences in the conditions of the trade from a few years ago have been widened.

The greater activity of the year in development of new ore mines has been by the concerns associated with consumers of ores, and these same interests have been more largely interested in exploration than any others, and have been, with transportation interests, almost the only market for properties explored or developed. The ultimate disposition, therefore, of almost every one of the ore bodies opened into during the year has been one or another of these great interests, either with the aim of furnishing ore for consumption or for transportation. Thus the independent miner, so called, has been still further eliminated, and there is not one large concern in the Lake district that is now not interested alike in mining and steel making, or in mining and transportation. The single great Marquette range interest that has been spoken of most frequently as an independent company is not only a consumer of a small part of its ores, but is engaged in transportation by lake and rail, and is now planning further and important extensions to its pig iron capacity. It is the case with this company and with another producing, shipping and furnace interest that has mines on the Menominee, Gogebic and Mesaba ranges, that they have much more ore to sell than they use and they are thus to a certain extent independent concerns.

But the Cleveland-Cliffs Iron Company's production of Bessemers is very small, while the second of these concerns, Corrigan, McKinney & Co., are not producers of old range Bessemers to any appreciable extent. As a matter of fact the situation has reached such a point at this, the close of the century, that the control of the "Bessemer Pool," as it is called—the association controlling the output of old range Bessemers that is for sale in the open market—is in the hands of two or three men operating two or three relatively unimportant properties on the Gogebic range. This, I take it, is one of the most striking facts of the ore situation to-day.

This is not intended to mean that all the old range Bessemers for sale are included in this control, for that is not true; but those who do have other desirable Bessemers for sale are doling them out in an endeavor to "sweeten up" and help the sale of other ores that are not so desirable, but which they control ond must sell. In this way the output of a number of Bessemer properties has been taken off the general market.

The Search for Ore.

There has been a continuance during the year of the search for ores in new ground along the old fields. This has continued, generally speaking, through the boom days of the early part of the season and the dull period of the later year, most of the large companies following out this policy whether the immediate conditions were satisfactory or otherwise. They realized the facts and were not willing to forego the opportunity of securing ores of a desirable quality, no matter what the day's market for steel might be. Any change from this policy would, of course, be shortsighted and vaccillating, and it is a surprise that it has been adopted by any of the important concerns, as it has.

This search of the year has not been rewarded with the results hoped for; indeed it may be said that almost no new ore has been found. Many old and known bodies have been explored and developed till there is far more ore in sight than they had when operations commenced, but even with this reservation the development has not been commensurate with the energy evolved or the sums expended, which latter have been very large.

Almost no expenditure has been considered too large to utilize and develop ore bodies that have been opened into. At the Hartford of the Marquette range, for instance, the Oliver Company have sunk a shaft 800 feet to reach an ore body they found last year by the aid of the diamond drill. At the same company's Riverton properties, Menominee range, the course of Iron River has been changed for a considerable distance by the construction of dams, the cutting of channels and the complete diversion of the stream. New shafts are being sunk, old ones deepened, machinery equipments are being provided for heavier work all over the five ranges where the conditions seem to warrant. The strike of ore formations is being followed with persistence and much care at old mines, and it is the intention to leave no effort untried to find the last lens of ore in a mine before it is abandoned and reverts to its original quiet.

On each of the lake ranges there is a considerable area that may be regarded as promising and that in which as yet no ore has been found in quantity. Twelve months ago this area was a good deal larger than it is now; another 12 months and it will be smaller still. By the work of this year the limits of this area have been quite closely approximated; some formations that were believed productive have not been found so, and in a few cases ore has been opened into where it was scarcely expected. There is a large area on the Menominee range in which mining men hope for results; there are portions of the Marquette that may contain deposits; there are extensions in the Gogebic that are likely to continue the ore lenses of that range; there are large unopened areas on the Vermillion that, though recent explorations there have been disappointing, are likely to receive attention in the near future, and there are large areas along the Mesaba that may repay investigation. Certain it is that all lands in which it is at all probable ore may be found will be carefully, scientifically and exhaustively explored. The deposits of high grade Bessemers are dwindling and there is quite evident need of all ore that can be found.

While the deposits of the Lake region have often been characterized as inexhaustible, that term must be taken as merely relative. What seemed without limit when the production of the region was a few million tons a year is very different when set against a production of 20,000,000 tons or more. It is not impossible that the 20,000,000-ton mark is being passed not to be receded upon except in unusual years. It was 28 years after shipments began from the historic Jackson pit that the sum of the business of the lake district reached the figure of the present year. It was but five years ago that the total reached 10,000,000 tons per annum. Now the volume of business is almost double that.

The Bessemer Ores.

The fancy Bessemer ores of the older ranges, excepting the Gogebic and new Vermillion fields, are practically gone. On the Mesaba, whatever may have been said, the far greatest share of desirable Bessemers is included in the limits of one township, or close to its edge. The Menominee range has little Bessemer ore, nearly all coming from the Aragon, Loretto and Pewabic mines. On the Marquette the once famous Lake Angeline mine is fast nearing the end of its fine Bessemer ores, and there remains but a few years more of their production. All the mines of the Oliver Company on that range are now classed as non-Bessemer, and the Cleveland Cliffs are disappointingly light in their Bessemer production. The ore bodies under Lake Angeline are not furnishing the percentage of high grade ores that was expected. Explorations on the range are showing few Bessemer deposits. On the Gogebic one company control four-fifths of the deposits, if one may judge by the production, and a large share of the rest is off the market. Explorations around the old Comet and the Puritan, Federal and Jackpot group are said to be producing good results, and there are hopes of some considerable tonnage in that section. On the Vermillion the original mine, the hard ore property at Tower, is now practically a producer of non-Bessemer ores exclusively. The Chandler is reducing its output, and in a very few years will be exhausted. The new mines of the Oliver Company are large properties and are growing larger, but they have no effect on the general situation, as their ores are of a class that the Carnegie Steel Company will retain for their own use. On the Mesaba there have been some satisfactory explorations during

the year, but the chief fact resulting from the immense activity on the range is that its stores of low grade non-Bessemers are very much in excess of its fancy ores. There have been found very large deposits of lean ores and of ores high in phosphorus or of ores so fine and dusty that they are discriminated against, but of high grade, desirable Bessemers the discoveries can be counted quickly. It would appear that the larger deposits of the range have been found and that subsequent work will discover smaller, perhaps more inaccessible and less valuable deposits. There are large areas in the westerly and easterly extensions of this ore bearing formation that are yet to be thoroughly prospected. Some work has been done in the eastern end of the range, and though after considerable blowing of trumpets it has been rather disappointing. Neither quality nor quantity have been such as was expected from first discoveries. This work was done close to the original ore finds of the Mesaba, tested in 1892 and earlier and then discarded. Better exploration has found the ore. The results now are far better than then. Still further east there have been explorations during the year, but they have not resulted satisfactorily at all. In the western part of the range there is a considerable territory yet practically unproven. What work has been carried on there has been very disappointing, and in one instance it has been impossible this year to find ore in a property there that a few years ago was reported as containing large quantities of Bessemers. This is due also to more careful and better exploration.

On the Mesaba the gap that a few years ago existed between the great deposits at Mountain Iron and Hibbing has been rather thoroughly gone over and closed up, many ore bodies having been opened therein. Most of these were known early in the development of the range, but lay almost forgotten during the dull period of the panic. A string of excellent ore bodies has been opened into across townships 58-19 and 58-20, and most have been absorbed by large steel making and transportation companies. Around Mountain Iron several ore bodies have been proved up during the year, most of them of low grade and without great present value. The Mountain Iron itself, heretofore called a Bessemer property, has been removed from that list and is now admitted to be very largely non-Bessemer. The same is true of the Oliver Iron Mining Company's properties about Virginia.

The Michipicoten District.

The year has seen one development of much importance. That is the opening of a new field. Some sixteen months ago the Algoma Commercial Company began the construction of a railway from Michipicoten Harbor, northeast shore of Lake Superior in Canada, to their newly discovered ore properties 12 miles inland. This August the first shipments were made, and by the close of the season the total movement had been 62,000 tons. The ore here is not of high grade and is largely non-Bessemer. As yet the full extent of the deposit at the Helen mine is unknown, though there is enough in sight to warrant the expenditures already made and planned. Owing to the short rail haul and the comparatively slight mining cost, the mine being situated on a side hill and above ground, the company can probably ship an ore that would not bear the charges of transportation from the head of the lake. Its average analysis for the season has been in the neighborhood of 60 per cent. iron. The structure of this ore is excellent, and it should be a favorite in the furnace. So far the Algoma Company have opened but one mine, the Helen, but they have a large territory along the ore bearing formation and have found several additional deposits that they have yet had no time to explore. One of these, the Josephine, will be reached by their road the coming year. This ore is said to run better than that of the Helen. What the Michipicoton district may become no man can now predict, but it would appear as though it would be an important source of supply in future years.

The Atikokan Range.

There have been explorations all along the north shore of Lake Superior, in Canadian territory, from the Michipicoton on the east to the Lake of the Woods on the west. The distance is so great, some 500 miles, that the merest surface scratching has been possible. So far the results have not been so satisfactory as had been hoped. With the exception of the new Atikokan range, a large part of which has now been secured under option by one of the larger makers of finished steel in the United States, scarcely one section has been opened into that is not handicapped by so serious objections as to render the use of its ores a grave question. Geological conditions during and since the time these ores were placed have been such as to make them largely undesirable. To be sure in such a vast territory as this the developments of a year may make a change in all conditions and ores of different nature may be discovered in quantity. There are ore bearing formations, often outcroppings, at many points in the great district. Many have not been sufficiently examined to determine their value. West from Michipicoton ore has been found at several places east of the Nipigon River, and along that stream there have been recent discoveries that are said by common rumor to be excellent. West from the Nipigon there are ores of iron. Near Thunder Bay these are persistent and have been supposed to be of value, though recent explorations are not encouraging. West of Lake Superior, on Hunter's Island, in the Mattawin River region, on the Atikokan, along the Seine and elsewhere are very large deposits. Not enough is known about Hunter's Island to determine its characteristics; the ores of the Mattawin are jaspery and in thin deposits, the Seine River finds are very large but are understood to be titaniferous. Across the line from Hunter's Island, in Minnesota, the ores of the Gunflint Lake region are being examined by a company that have spent and are still spending large sums, but the general opinion is that the ore is not of a character to repay the investment. So far as I know the ores of the Gunflint Lake region are thin and much mixed.

The Atikokan developments are important. The ore is a magnetite, running as high in iron as anything often shipped from the Lake region, and so low in phosphorus as to be most desirable admixture. The development so far has been merely exploratory, but an extensive work is planned for the immediate future, an option for a large sum expiring in about five months. The ore rises above the surface, is cut by a tunnel on the level of the surrounding country, and the outcroppings extend for several miles.

Leading American ironmasters have been assured by the president of the Ontario & Rainy River Railroad, which is now building past the mining locations of the Atikokan range, that a rate of ½ cent per ton per mile will be made for all ore shipped out to ports at Lake Superior. The distance to Port Arthur, at the head of Thunder Bay, is 115 miles, so that this hard ore will be delivered at dock at less than the rate now charged from the Vermillion range to the Lake. The road has also agreed that it will erect such docks at Port Arthur as may be needed and will care for the traffic. The Ontario & Rainy River road expects to make a similar rate for all ore mined along its main line, which includes at present the Atikokan and Mattawin discoveries, or on any of its branches, which at present include only the line running to the Gunflint range, in Northeastern Minnesota, where explorations are now under way. The Mattawin and Gunflint are much nearer the lake than the Atikokan, but they do not carry such ore.

In connection with the purchase of mines by consuming interests has come the purchase by selling agencies, a new departure. As the selling agents saw their business restricted by the absorption of mines by consumers, and realized the profits to be made by developing new properties, they took hold, and now are an important factor in the mining of ores.

The Controlling Interests.

Of the various iron producers west of tidewater there are now represented in mines of the Lake region the Carnegie Steel Company, the Federal Steel Company, the National Steel Company, the Republic Iron & Steel Company, the American Steel & Wire Company, the Cambria Steel Company, the Sharon Steel Company, the American Steel Hoop Company, and Jones & Laughlins. Of these the ore department of the Carnegie Company is very easily in the lead. Under the name of the Oliver Iron

Mining Company they hold the Pioneer, Zenith, Sibley and Savoy on the Vermillion range, all producers of desirable soft Bessemer ores; the Mountain Iron, Missabe Mountain, Lone Jack, Ohio, Norman and Stevens, of the Mesaba range, all producers of soft Bessemer and non-Bessemer ores; on the Gogebic they have the Norrie group, the Aurora and Tilden, all producers of desirable Bessemer ores; on the Marquette they have the Hartford, Riverside and Bessie, all non-Bessemer mines, have a three-fourths interest in the group of mines owned by the Lake Superior Iron Company and the group of the Queen mines at Negaunee, al producers of non-Bessemer ore; and they have on the Menominee the Iron River group of the Riverton and connected mines. On the same range 50 per cent. of the Pewabic mine is owned direct by the Carnegie Steel Company. Besides this formidable list of mines the Oliver Company hold a large number of tracts under exploration, chiefly on the Vermillion and Mesaba ranges, and have large acreages of undeveloped and desirable lands on these ranges and the Menominee. In the first the company are exploring east of Tower and near Ely with good prospect of success; in the second they have several large explored but unopened mines in the Sherian, Shaw and others, and the lands of the Security Land & Exploration Company, and in the third their most favorable exploration is at Lac Fumee.

The Federal Steel Company, through the Minnesota Iron Company, hold a vast territory on the Vermillion and Mesaba ranges. Those on the Vermillion range include the Soudan hard ore mines at Tower, non-Bessemer, and a majority interest in the Chandler mine at Ely, soft desirable Bessemer. There are also many explorations and thousands of acres of unopened lands along the formation. The Mesaba mines of this company are among the best on that range. They include the Fayal, Genoa, Elba, Corsica, all desirable soft Bessemer ore; the Auburn and Canton, not so desirable, and considerable tracts of undeveloped lands, as well as the Moose, Iron Chief, Pittsburg and other explored and valuable tracts. A single one of these latter contains upward of 20,000,000 tons of ore, while the Fayal is supposed to be good for 1,000,000 tons a year for the next 50 years or more. The Manila Iron Company operate some explorations on the Michigan ranges, and the Cundy and Iron Ridge are also in the possession of the company.

The National Steel Company have for their chief possession in the lake region the splendid Chapin mine, a most desirable non-Bessemer ore. The Winthrop mine at Ishpeming is also theirs. They have in addition 25 per cent. in the great Biwabik mine and a sixth share in the ore mined by the Oliver Company, under their purchase of the Oliver Furnace and holdings some time ago. This gives the National Steel Company a total of ore from their own sources the past year of more than 2,000,000 tons.

The ore properties of the Republic Iron & Steel Company are confined to the Cambria and Lillie on the Marquette range and to the Franklin group, 50 per cent. of the Union and a 6 per cent. interest in the Mahoning mine. All these properties are Bessemer and some of them of a very high class. The company have also some undeveloped explorations that may result.

Ore properties of other concerns are smaller, but are in some cases sufficient for a larger portion of their needs. The necessity of controlling their own ore is so apparent now that no new steel making comapny would be likely to start business without first securing themselves in at least a portion of the high grade ores that they would need. There are such stores of lower grades, and they are to be had at such prices, that the necessity of ownership of these is not so apparent.

Aside from the steel makers who are heavily interested in the ore mining business there are miners who have the making of pig iron as a side issue, and these include the Cleveland Cliffs Iron Company of Ishpeming, the firm of Corrigan, McKinney & Co. of Cleveland and others. The mining business of the Cleveland Cliffs Company amounts to more than 1,000,000 tons a year, and they utilize a part of their lower grades of ore in charcoal furnaces near the mines. The company are making preparations to largely extend this branch of their business. With several railways extending through their lands, with a large acreage of undeveloped mineral land and with more than 200,000 acres of densely wooded hard wood land, and with their own ore supplies, this company are in shape to make a considerable output of high grade charcoal iron at a reasonable price.

The Present Year.

The indications are now that the mining of ore the coming season will be on as large or a larger scale than during 1900. The more important producing-consuming companies are preparing for a larger output, some of them markedly so. The proportion to be shipped from the Minnesota ranges will increase, indeed must do so as many of the mines of Michigan ranges are now mining pretty well up to their economical limits. Furnacemen will be called upon to use a still larger proportion of Mesabas in their mixture, a proceeding sure to excite no little protest on the part of many who now think they have more of that ore than they should have. But the pressure to consume as great a proportion of Mesabas will continue so long as these ores are sold at a less price, per iron unit than others, and this differential is likely to be permanent. There are considerable amounts of ore left in stock at mines not shipped before the close of navigation, and there are many thousand tons lying in cars in transit, caught by the extreme cold snap of late November.

There has been much talk of a lower range of ore prices for the coming year, based on the expectation that the ore association controlling old range bessemers, will see fit to reduce its scale. The hope for lower prices is probably without foundation, except in so far as lower freights may cheapen ores at point of delivery. It is safe to say, in other words, that there will be very little shrinkage in the 1901 price of Association Bessemers above that caused by the expected reduction in Lake rates. Indeed it is quite possible that a part of this shrinkage will be absorbed by the mines, and that the furnaces may not get all the benefit of lower Lake rates. Freight rates will probably rule from 50 to 65 cents under the season rate of 1900, and there is likely to be a part of the summer when they will be lower than 60 cents a ton. It will be a year of exceedingly small profits for the vesselman, and of no profits at all for a large portion of the Lake fleet. It will be, on the other hand, a year of profits for mines and of a continuance of the careful search for ores that has characterized the past 18 months.

Orders have been given Chief Explorer Bradt of the Manilla (Federal Steel) Iron Company to cease all explorations on the Menominee range, and he stopped at once, shipping all material and supplies to Duluth. It may be that work will resume at some of the explorations in the spring. There was very marked surprise when the orders were received, as it was supposed some of the work near Iron Mountain was exceedingly promising. Federal Steel interests have not succeeded the past year in explorations as had been hoped, and have a large balance on the wrong side the ledger. I hear their work in section 25, 63-12 has cost $60,000, and its results are not visible to the outsider at least. But unsuccessful explorations are not confined to this company, for not less than $300,000 have been spent unsuccessfully on the Vermillion range during the year.

Not a mine is active now on the East Michigamme district; the Imperial and Beaufort were the last to close. Probably they will resume with others in the spring. The Imperial and Webster, operated by the Cleveland Cliffs Company, have been rejuvenated during the year and made to furnish a product of 85,000 tons, which is a good work. Beaufort's shipments, by the Commonwealth Iron Company, were 1582 tons. The Beaufort is looking well underground. Another rejuvenated mine, the old Jackpot, on the Gogebic, now operated by the Pittsburgh Lake Angeline Company, has made a shipment of 34,016 tons. Jackpot's prior shipments were under 7000 tons and most of this in 1892.

A good deal of all rail shipments is going on to furnaces. The Chapin has made all rail shipments during the year of over 200,000 tons, and Crystal Falls, Quinnesec, and Bessemer have sent out large amounts. Cleve-

land Cliff mines are shipping to the company's furnaces, Lillie to Manistique, and others to local plants.

On the Menominee shafts are being sunk at Armenia and Hope to open them for shipments next year. Superintendent S. C. Bennett, who has had charge of these and the rest of the Corrigan properties on the range, has resigned. He has a high reputation as a mining manager. Explorations have started 3 miles north of Amasa. The Gibson exploration of the Oliver company has been suspended for the winter. It is supposed the showing is fair. Ore has shown in the James exploration at Iron River.

The Minnesota Railroad and Warehouse Commission has taken the action expected, and without hearing evidence of two of the roads at issue, and but part of that of the other, issued an order to-day for a reduction of Mesaba ore freight rates from 80 to 60 cents, of rates from Soudan from 90 to 70 cents, and of rate from Ely from $1 to 80 cents. This would make a difference of about $2,000,000 on the business of such a season as the present. The commission has been outgeneraled to a finish by the roads, and the latter now stand in a splendid position to fight the action before the courts, to which they will go, the action taken to-day being no finality. The commission has acted unreasonably throughout the entire hearing, has refused to receive testimony, has not been willing to give a reasonable time to the roads to prepare evidence, and has acted throughout as prosecutor, exercising no judicial supervision at any time. The records are such as will give the roads a practical cinch before a court of justice, whatever may be the merits of the question, and the courts will be appealed to at once. A full hearing will then be had.

The demand for ship plates and shapes will be increased by a contract just given the lake shipbuilding combination for four 450-foot ships for F. H. Peavey of Minneapolis, and A. B. Wolvin of Duluth. The boats are to duplicate the "Mataafa" of the Minnesota Iron Company, of about 7500 tons, and will be out in September and October next. They will be for the ore and grain trade. They make 30 ships under contract by the American Shipbuilding Company. Other lake yards have on hand some ten steel ships of cargo size. D. E. W.

The Maryland Tin Plate Company.

The Maryland Tin Plate Company have broken ground at South Cumberland, Md., for the erection for the use of the N. & G. Taylor Company of Philadelphia, lessees, of an additional black plate plant, complete, including two hot and two cold mills, pickler, annealing furnaces, &c. The same will be covered by a steel structure 154 feet long by 75 feet wide, and will be entirely separate from the present mills. They are also doing the preliminary work for a third black plate mill, in case they decide to complete the third mill later on. They are also putting down the foundations for a modern bar mill with a capacity of 5000 tons monthly, which they can complete in one month's time, should they decide later to make all their own bars. New boilers will be added to furnish power for the additional mills and a new engine of 1000 horse-power will be put in.

This entire product of black plates is shipped to the N. & G. Taylor Company's tin plate works in Philadelphia, where it is finished and tinned. Their tin house contains 25 tinning stacks and requires the output of more than seven black plate mills to feed it, the larger part of the output consisting of their special brands. Their present lease of seven years with the Maryland Tin Plate Company has, it is understood, been extended ten years.

Cramps-Vickers Sons & Maxim.—Report has it that next week a decision will be reached in the negotiations between the Cramps and Vickers Sons & Maxim. The $10,000,000 new 4½ per cent. debenture bonds have already been underwritten in London, New York and Philadelphia. The Morton Trust Company are handling the issue in New York. The proceeds of $1,500,000 of these bonds will be used to retire the Cramps Company 5 per cent. bonds at 110. The proceeds of $7,500,000 of the new issue will be invested in a steel plant. Whether or not the Midvale plant will be purchased has yet to be determined, the decision hinging upon the acceptance by that company of the terms offered. Five million new 6 per cent. cumulative preferred stock is to be exchanged, share for share, for the present Cramps Company stock, nearly $5,000,000 outstanding, which now pays 5 per cent. A syndicate stands ready to take the remaining $5,000,000 of new preferred stock, which will inject that much new capital into the combined business. The $10,000,000 new common stock will be taken by Vickers Sons & Maxim interests and will pay the cost of the American banking operations.

Notes from Great Britain.

Depression.

LONDON, December 22, 1900.—Even the pessimists are alarmed with the sudden depression into which the whole iron and steel trade has fallen during the past week. Personally, I have never been very hopeful that the prosperous period would last much longer, and it now seems that nothing short of a miracle will save us from a very serious trade depression in the next month or two. After four years of expanding trade it seems curious once again to be reading in the various papers of depression. There lie before me at the present moment four articles in well recognized authoritative papers all with the heading "Depression." "Depression in the Iron Trade," "Depression in the Welsh Iron Trade"; another speaks of "Deepening Gloom in the Iron, Steel and Coal Trades"; a fourth says "No Improvement of Tone Revealed." The sum and substance of the whole situation is that the coal owners have rendered trade impossible, and that now when they have started to reduce their prices the market has slumped. In South Staffordshire the situation seems to be exceptionally bad. The high prices which obtained during the summer at length began to check trade, and since then buyers have been coy to an irritating degree. The consequence is that South Staffordshire furnaces have been either blown out or damped down. To make matters worse one large manufacturer has called his creditors together, while the old Hange furnaces at Tipton carried on by Round Bros. for nearly half a century have gone to the auctioneer's hammer. The proprietors resolved upon this course because of the heavy cost of manufacture due to fuel charges and because the furnaces are now slightly out of date. At the Birmingham iron trade meeting held last Thursday there was a good attendance, but very little business was transacted, while it was decided to prolong the Christmas holidays for a fortnight. It is hoped that in the meantime the market will steady itself; but I do not think this hope has much chance of being realized. It is argued that an improvement is bound to be near because it is known that a large amount of work is being held back, while stocks are very small. But contracts are also running out and it cannot be denied that customers have lost confidence in the stability of prices. The Birmingham manufacturers are calling loudly for a revision of colliery owners' lists, as it is felt that at the present moment the key to the position is the price of coal. The official iron trade prices are still being quoted with all the solemnity of Mr. Bumble. Marked bars, $50.50; North Staffordshire unmarked bars, $40; Bessemer billets, $27; best Siemens billets, $27.25; mild steel bars, $41; steel girders, $40, and so on. That these prices are more apparent than real may be judged from the fact that on December 20 a Birmingham merchant received from Belgium quotations for common merchant bars f.o.b. Antwerp, $32; basic steel merchant bars, f.o.b. Antwerp, $27.60. The Birmingham merchant points out that as these official quotations are generally supposed to be for consumption in Government quarters, and as a guide to Government prices in making out Government contracts, they cannot fail to undermine the confidence of the Government departments. He says the public must not be astonished if some Government departments feel tempted to place their orders in America and on the Continent without inviting tenders from home manufacturers. Indeed, it looks as if even yet British iron-

masters are not fully alive to the serious nature of the situation. In South Wales the Albion Steel Works have discontinued operations and the staff paid off. The smelting furnaces of the Briton Ferry Iron Company have also temporarily closed down, while the Cambrian coke workmen are working on day to day contracts. The iron market in the north of England is in an equally precarious condition, the situation of makers and merchants being most unfavorable. And just as in the Midlands, so in the North of England, the consumers are still steadily holding off and certainly they are not entering into contracts. Everything points to a falling market, and there is every fear that with the turn of the new year matters will be even worse. In the north of England a healthy trade has hitherto been done with the Continent in the spring of each year. But the German iron and steel trade seem to be in an equally parlous condition, so that that particualr trade seems to be lost to us at a time when we want it most. I have already indicated that German merchants, having bought large stocks of pig iron and finding the trade activity thus unexpectedly terminated, were trying to unload upon the English market. This movement is now being felt to an acute degree. German merchants are offering to resell hematite at $17 in the Cleveland district, where stocks are rapidly rising. In Scotland it is just the same; the Scottish market will follow the Midlands in prolonging the holidays as long as possible, but no new contracts are coming in, and so far as I can see at present the Glasgow holidays will last pretty much through January. Scotch hematite pig iron makers are selling at $20, but this price is too high when we remember that West Cumberland hematite can be bought in the Glasgow district at $2 cheaper. American plates are now being unshipped in the Clyde in large quantities, 3000 tons of steel being unloaded as I write. The puddled iron trade is just simply at a standstill. What is worse, the Scottish malleable trade has been losing money heavily during the past few months. This movement is so sudden and startling that makers and merchants have not yet habituated themselves to the dramatic change from prosperity to adversity. I imagine the depression has been accentuated by most discouraging news from South Africa. The war seems far from over, and as I write there are most ominous rumors as to a rising of the Dutch in Cape Colony. The money market continues to grow in stringency and altogether the outlook is very gloomy. When the Chancellor of the Exchequer brings up his Budget next April he will find himself the most unpopular man in the Empire.

The Reduction in Coal Prices.

As I have indicated above the coal masters seem at last to be coming to their senses and the railway companies are now buying coal at a reduction of $2.75, as compared with a month ago. There seems general satisfaction that the coal ring has been broken into, and I should not be surprised if we hear before long of some vindictive reports calculated to make the coal owners sorry they ever "held up" the iron trade to the point of paralysis.

Russian Freights for German Iron.

The attention of British iron manufacturers has been called to an alleged arrangement with the Russian and German Governments. Whether an actual arrangement has been made is doubtful; but that negotiations are proceeding is certain. The proposed arrangement is between the Russian railroads and the Prussian National railroads, to carry into execution a project of the Russian Minister of Finance, which aims to obtain for Russian petroleum lower transportation charges on Russian railroads. Germany it is alleged is willing to carry on her railways Russian oil at one-sixteenth of a kopeck per pood per verst provided Russia reciprocates by giving low railway rates for German iron. The principle apparently has been agreed upon by both Governments and freight schedules are now being made out on this basis. The differential rates granted by Russia comprise ironware and manufactured iron as well as pig iron. This agreement discriminates badly against British trade and, in so far as Americans are pushing their trade in Russia, it will injure them, too. As Russia is going to be one of the great markets of the near future it will be well for Americans to watch this closely and see if anything can be done.

German Armor Plate Manufacture.

Baron Stumm, one of the chief armor plate manufacturers in Germany, has made a statement which appears in a recent report of the Committee on Naval Affairs of the German Reichstag, in which are several interesting figures as to the cost of armor plates. The business profits of the Krupp and Dillingen works on armor plates, he says, had been quoted as amounting to 176,000,000 marks. The new armored ships required 49,000 tons of armor material at a cost of 113,000,000 marks. Therefore, even if it were taken for granted that half the price constituted a clear profit, this would amount only to 56,000,000 marks, which, divided over 16 years, would be 3,500,000 marks annually, or 1,750,000 marks for each concern. The manufacture of armor plate, he continues, is very difficult; within 20 years the method of manufacturing has been remodeled three times. The least mistake results in rejection, and naturally entails heavy losses. For years the prices of armor plates had not been raised, although wages and cost of raw material had doubled. So far the letter. In reply to this, according to the report, the committee argued that the total demand for armor plate, based upon the estimates for new vessels and remodeling for the next 16 years, would amount to the sum of 260,000,000 marks and not 113,000,000 marks. If, therefore, as would seem to be admitted by Baron Stumm, half was profit, this would amount to 130,000,000 marks, which would be divided between only two firms. A net profit consisting of half the contract price was exorbitant. Therefore a termination of the monopoly, either by the establishment of works by the Empire or by the participation of trustworthy competitors, appeared to the committee as strongly advisable.

Iron Making in Australia.

The annually increasing quantity of iron, in the raw and partly manufactured state, imported into these colonies is causing greatly increased attention to be drawn to the possibility of developing the manufacturing trade locally.

The value of imports into Australia and Tasmania (exclusive of New Zealand), during 1899, of iron, raw or partly manufactured, was £2,326,000, equaling, in round numbers, 388,000 tons. Of this amount the colony of Victoria took over 65,000 tons, value £611,000. These figures, considering the population of Australia, say 4,500,000 of people, may be considered fairly large.

Large ironstone deposits of a reputedly rich nature exist in Victoria, New South Wales and Tasmania, and have lately been the subject of much interest on the part of English and local capitalists. The Federal Iron Company of Lal Lal, Victoria, a short account of whom has appeared before, have just placed their prospectus before the public. Capital £60,000 in £1 shares, of which the present proprietors of the mines take £15,000, £25,000 are offered to the public at par, and £20,000 shares are held in reserve by the company. Twenty-five thousand shares at £1 each seem a small quantity to provide the working capital for an undertaking of this nature, but, granted that the directors find it sufficient, there seems no doubt of their ability to supply a good quality iron at Melbourne foundries at about £3 per ton, as against the present price of about £5 15s. to £7.

The company will in all probability obtain State assistance, either in the form of reduced carriage on the railways (State owned) or in the way of a protective tariff as soon as they are able to prove their ability to create another industry likely to benefit the colony. The present increased cost of iron, due to increased consumption and increased cost of production throughout the world, is another factor in their favor. Nor is the above the only scheme of its class.

The New South Wales Government are at present negotiating with an English syndicate, the Blyth River Iron Company, for the supply of 100,000 tons of steel rails to be manufactured locally from ore to be shipped

to New South Wales from Tasmania, where the company possess land containing rich ironstone deposits.

The above notes will serve to show the way the wind blows out here. American pig iron has enjoyed a very fair share of popularity among local founders here during the past few years, and has been energetically hustled into favor, although lately, I understand, imports have been in small quantities. All local indications point to the fact that American makers will in the near future have a protective barrier built against their pig iron in favor of the local article.

Trade Publications.

New Shops.—We have received a complete description of the new shops of the Canadian Rand Drill Company, Limited, at Sherbrooke, Quebec, built under the supervision of James F. Lewis. The shops are located on the south side of the Magog River, upon the main line of the Canadian Pacific Railroad, and are so designed and aranged as to provide for growth in the future. The buildings are designed according to the latest ideas of factory construction, while the equipment is up to date in every respect.

Power Presses, Shapers and Drop Hammers.—A large catalogue has been received from the Perkins Machine Company, Boston, Mass., describing the several machines built by them. They manufacture a full line of plain and adjustable power presses, single and double acting. Their power horning and blanking presses are provided with an adjustable bed to conform to the varying thickness of the dies. This construction also facilitates the manufacture of lock seamed tinware, stove pipe, elbows, &c., and obviates the necessity of a bar folder for forming the hooks on the body blank before rolling the same on a forming machine. Their presses furnished with single and double feed rolls are especially designed for blanking, piercing and forming small articles such as boxes, buttons, chains, &c. A strip of stock is fed from right to left or left to right. The first rolls feed the stock as the plunger goes up, while the opposite rolls take care of the scrap stock. These rolls are generally made of steel, but sometimes of hard rubber, composition or wood, according to the material to be handled. Some of their power presses are also fitted with automatic feed rolls and inking attachment, printing in two colors and punching cards at the same operation. Their single and double punching and shearing machines are made with any desired depth of throat from 6 inches up, and are all equipped with automatic stops. Their automatic clutch is very simple in design and positive and instantaneous in its action. Their open gap drop hammer is especially adapted for stamping long work where the straight sided presses would interfere. The bed and uprights are cast in one piece and the guides are made extra long so as to insure accurate work. They also describe the largest compressed air drop hammer ever built, which will handle a blank 30 inches wide by 7½ feet long of sheet steel, No. 22 gauge. Their 15-inch noiseless adjustable friction shaper will take a ½-inch chip 1-16-inch thick in cast iron with ease. With this shaper is provided a vise which possesses many admirable features.

Horizontal Milling Machines.—The Becker-Brainard Milling Machine Company, Hyde, Mass., have prepared a complete catalogue of their horizontal milling machines with attachments, automatic gear cutters, milling cutters, cutter grinders, &c. Their No. 1 Universal is a very large and powerful machine. It will drive gangs of cutters 18 inches long on wrought iron, and yet it is capable of such accurate work that it can be used in the tool room. It will cut bevel, spur and worm gears, also all of the various milling cutters needed for any kind of work, such as straight, bevel, spiral, conical or irregular shaped mills. It is also adapted for milling straight or circular slots, fluting taps or reamers, cutting key seats, cam cutting, and a variety of other jobs almost innumerable. In their upright plain milling machines the automatic feed is by a worm running in a rack, the teeth of which are worked out to exactly fit the worm. A spiral pinion connected with a crank shaft also engages the rack and runs as an idler when the machine is feeding automatically. When the automatic feed is tripped the worm drops clear of the rack and the table is run back by means of the spiral pinion direct, at the rate of 3 inches for each turn of the crank. The combination of screw feed and rack and pinion return gives to a great extent the advantages of both kinds of feed without the disadvantages of either. Where, however, it is necessary to mill to a line it is better that the worm should not drop out, therefore some of the machines are so made as to keep the worm always in mesh, and the quick movement back is by means of Brainard's patent quick return gearing. On some of the largest sizes, on which the work table is very heavy, a third plan is adopted; here the automatic stop dog disconnects the outer feed worm without affecting the main feed work in the rack. Upon pushing a hand latch the main worm is dropped and the table is easily and quickly run back by means of the spiral pinion. The bearings of the work table in the carriage are very long, and the length of feed is limited only by the length of table. The work table has three longitudinal T slots and oil or tool pan at each end.

Gaskets and Boiler Tube Ferrules.—The McKim Gasket Mfg. Company, Ninety-sixth street and River, South Chicago, describe their gaskets and ferrules in a neat catalogue. Their gaskets for ammonia, alkalies, gases, acids, &c., are made of a special packing incased in a soft rolled metal impervious to chemical action and sufficiently ductile and elastic to make a tight and elastic joint without straining the bolts or union. Their gaskets for steam, gas, air, &c., are made of rubber incased in soft rolled copper extra annealed so that they will accommodate themselves to faces on rough joints. Their water tube boiler gaskets cannot blow out, are reversible and interchangeable, will not leak whether the boiler is hot or cold, and can be used again and again.

Gas and Gasoline Engines.—A catalogue from the New Era Iron Works Company, Dayton, Ohio, describes their gas and gasoline engines in detail. These engines, which are in sizes of from 5 to 125 horse-power, are built on the plan of a lateral shaft rotated by a spiral gear on the crank shaft, which in turn drives the governor by bevel gears and operates directly on the valve stems by means of cams. The valves are arranged so that they can be taken out or ground in by merely removing the nut that holds them in without disturbing any other part. The engines are provided with either an electric spark or hot tube igniter. These engines are reliable and economical in operation.

Engine Packings.—The United States Metallic Packing Company of Philadelphia have prepared a pamphlet descriptive of their packings for marine and stationary engines. The company mention that they have supplied over 125,000 packings with most satisfactory results, and that their output for the single year of 1899 was 12,365. The main success of their packing is due to its flexibility—that is, no matter how badly an engine is out of alignment or how much play there is between the cross heads and guides or between the piston and cylinder, the packing floats with the rod, offering very little resistance.

Chuck Monitor Lathes.—A circular of the Garvin Machine Company of Spring and Varick streets, New York, deals with their automatic lever chuck monitor lathes. The special feature of their class of monitors is the addition of the back forming atttachment, which is supplied with all sizes of machines, thus enabling all round castings of irregular shape to be finished by one passage of the forming tool, and at the same time to have the end bored, threaded, or drilled, as the case may require. The slip jaws used in their chucks interchange with the standard makes of slip jaw chucks.

Pipe and Boiler Coverings.—A catalogue from the Philip Carey Mfg. Company of Lockland, Ohio, deals with their coverings for steam pipes and boilers. These coverings are absolutely fire proof, and being thorough nonconductors of heat, confine the heat to the pipes and prevent its loss through radiation. They prevent the condensation of steam, obviate the necessity of excessive firing and largely reduce the amount of fuel necessary to operate a plant.

Machine Tools.—The Fox Machine Company of Grand Rapids, Mich., in their catalogue No. 19 deal with their single and multiple spindle high speed drills, milling machines and open side and crank shapers. In their No. 6 high speed multiple drill each spindle has independent vertical adjustment so that the required holes on all sides of large and irregular jigs may be drilled on the same machine, thereby saving much time.

The Davis Gas Engine.—The Davis Gasoline Engine Works, Waterloo, Iowa, have just issued a fine catalogue of their line of engines which enters more comprehensively into the details of construction than any of their previous publications. These engines are modern and automatic, are operated by natural or manufactured gas, gasoline or naphtha, and range from 3 to 45 horsepower. They are supplied with the Davis automatic governor, whose weight is in the rim of the fly wheel, which makes it more sensitive than if placed close to the shaft, and which they claim, if used in connection with their solid lock admitting valve, produces great economy in the use of fuel. The Davis governor is the result of years of experience, regulating the number of explosions in proportion to the load the engine is carrying, and is guaranteed to be at all times reliable. The company make both stationary and portable horizontal engines. The catalogue contains numerous testimonials.

Boring and Turning Mills and Multiple Spindle Drills.—Two catalogues, B and C, have been received from the Baush Machine Tool Company of Springfield, Mass., describing their multiple spindle drills and boring and turning mills. The spindles of these drills are adjustable independently, both vertically and horizontally, so that they may be made to cover any lay out. Their automatic stop and feed permits of great ease and rapidity in operating the head, besides relieving the workman of much unnecessary handling. It is thoroughly automatic, but may be operated by hand at the option of the attendant. The machines illustrated are of both the vertical and horizontal types and carry from 4 to 24 spindles. In boring and turning mills they have made several improvements during the past year which render these machines unsurpassed for economy and convenience of operating and for general adaptability to a wide line of work. Their 30-inch mill will take in 15½ inches under the cross rail. It has 16 changes of speed, varying from 1½ to 63 revolutions per minute. The feeds range from 1-40 to ¼ inch, with 16 changes. The swivel turret provided with this machine is 10 inches in diameter and has four holes. The turret slide has a traverse of 16 inches and in the swivel head can be set at any angle up to 30 degrees and will face 30 inches in diameter. This mill is regularly furnished with a three-jaw independent and universal chuck combined, but can be fitted with a plain table with or without jaws. A special feature of the combined chuck lies in the fact that it can be used independent or universal without the removal of any part. If it is desired to use it as a plain table it can be done by removing the jaws.

Coal and Iron.—The Tennessee Coal, Iron & Railroad Company, Birmingham, Ala., have prepared a very elegant volume, quarto size, in illustration of their several plants and mines. The original charter of this company was granted by Tennessee in 1860, after which they acquired the properties of the Sewanee Mining Company, the Southern States Coal, Iron & Land Company and the Sewanee Furnace Company, all in Tennessee. From 1886 to 1900 they obtained control of the properties of the Alice Furnace Company, the Pratt Coal & Iron Company, and the Linn Iron Works, the DeBardeleben Coal & Iron Company, the Cahaba Coal Mining Company, the Sheffield Coal, Iron & Steel Company and the Smith Mining Company, all in Alabama, and also the Bessemer Rolling Mill Company's property at Bessemer, and the Robinson Mining Company, while in 1898 they built the Ensley Steel Works. Work upon the steel works at Ensley, Ala., was begun in July, 1898, the first heat being poured in November of the following year. The plant was erected under the supervision of the Wellman-Seaver Engineering Company. While this plant is surpassed in point of capacity by at least one other plant in the world, it stands unsurpassed by any one in point of entirely modern design, employing in the minutest detail every advantageous mechanical aid and device known in modern steel making and in point of harmonic and economic arrangement. The location of the plant is ideal for the handling of material during manufacture and for the shipping of the completed product. The process employed is the basic open hearth. The rail mill now in course of construction is continuous with the buildings and machinery of the mill department. It will include three trains of three-high rolls, tables, curver, hot beds, straighteners, &c. This mill is intended to turn out either small billets or rails up to 100-pound sections. The Ensley furnaces division comprises four blast furnaces in operation, with a fifth completed and nearly ready to blow, all in one plant. The by-product coke ovens are on the north side of the Ensley furnaces' stock house. They take coal from the Pratt mines division, convert it into coke and deliver it free of charge for transportation into bins in the furnace stock house by means of inclines operated with endless ropes. The coke is thus charged into the blast furnace before it has materially cooled from red heat. In addition the plant delivers to the steel works over 1,000,000 cubic feet of coke oven gas daily, this gas being a practical equivalent of the same amount of natural gas. Doubling the size of this plant is now under way. There are 300 coke ovens at the Robertson and 420 at the Bessemer plant, located conveniently to the furnaces, which entirely consume their product. They use coal from the company's Blue Creek mines. In the Bessemer Rolling Mill division are 24 single puddling furnaces of modern design, having a total capacity of 50 tons per day. The product from these is handled by a rotary squeezer and then by the muck mill, with roughing and finishing rolls and complete muck train. The sheet mill and plate mill are provided with roughing and finishing rolls, the former also having annealing furnaces in addition to the heating furnace. The bar mill has three-high rolls and the guide mill has one complete 8-inch train, making flats and bands up to 3 x ½ inch and squares up to ⅞-inch. The plant at Oxmoor includes two blast furnaces, while the Alice furnaces are two in number, and there are in addition 250 coke ovens. The Pratt mines division embraces 14 coal mines and 1072 coke ovens. The coal output of this division now averages about 7000 tons daily, and with the new mines now being developed this will be increased to over 9000 tons. The West Pratt mines have a daily capacity of about 1800 tons. In this division are 976 coke ovens in operation and 106 building. The book before us deals in detail with the other plants and mining properties of the company, of which it presents many very handsome and splendidly printed half-tone engravings.

Planers.—The Cincinnati Planer Company of Cincinnati describe their planers in a catalogue just issued. The bed is of the modern deep pattern, thoroughly braced throughout by box girders. The table is dirt proof, is of unusual thickness and is scraped to an acurate bearing on the bed. The housings are of such proportions as to insure the greatest stiffness. The cross rail is of extra width and is strengthened by an arch shaped brace on the back. The head is graduated for swiveling and is provided with automatic feed in all directions. It can be operated from either end of the cross rail and has a quick return. The down feed screw is provided with micrometer adjustment, graduated to thousandths. The shifting device is so constructed that the table reverses without shock or jar. It is also provided with a safety locking device, preventing the table from starting except at the will of the operator.

W. A. Clark of Butte, Mont., is credited with the statement that his contract for the sale of copper through Lewisohn Brothers expires January 31 and that after that he shall use most of it in his own wire works at Elizabethport, N. J., where 3,000,000 pounds of copper rods and copper wire are being produced per month.

The Morgan continuous bar mill at Mingo Junction, Ohio recently rolled 1,029,960 pounds of 1⅛-inch squares in 24 hours.

The Iron Age

New York, Thursday, January 3, 1901.

DAVID WILLIAMS COMPANY, - - - - - - PUBLISHERS.
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GEO. W. COPE, - - - - - - - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS, - - - - - - - HARDWARE EDITOR.
JOHN S. KING, - - - - - - - - BUSINESS MANAGER.

The Adverse Influence of High Prices.

Quite a number of interesting problems were worked out in the past year, some satisfactorily and others not so agreeably. The outlook for 1900 was considered very bright when the year was born, but we can now see on what a precarious foundation the faith in the future then rested. The year opened with an enormous amount of business booked by manufacturers in all lines, much of which had been taken at high prices and some at not only the highest prices for a number of years, but considerably higher than any one dreamed would again prevail in the iron trade. Under such circumstances optimism is apt to run riot and to picture a glorious vista of unending good times. The extraordinary demand prevailing throughout 1899 had greatly exceeded the capacity of the modern or well equipped iron and steel plants, and prices had consequently advanced to levels which permitted the restarting of long idle works that had been forced out of the race by their high cost of production. Such a condition of affairs could not be expected to be permanent, but the knotty question to be answered was, How long would it last? Some, and they were not novices in the iron trade, said for two or three years. Others, more cautious, believed that the Presidential campaign, which was considered the only possible disturber of business in sight, would inject a feeling of conservatism during the fall months, but even they did not look for a serious decline in prices from that cause, but merely a temporary lull. A small section of the trade took the position that prices had been pushed too far and that a readjustment would have to be made. Events showed the last view to be the correct one. Very little buying was done in the early part of the year, but it took considerable time for the trade to admit that the cause of the diminished business was excessive prices. When this was acknowledged, concessions began to be made, which did not stop until cost had been struck at average works on pig iron, steel billets, merchant bars, plates, and perhaps some other products. Thus was a very decisive answer given to the great question under discussion at the beginning of the year.

We can look back over the year and point out quite a number of influences which in one way or another unfavorably affected trade, but it must be admitted that high prices caused the greatest mischief. The spirit of enterprise was checked and consumption declined when iron and steel products, or manufactured articles taking considerable iron and steel, began to appear dear to buyers. They had not protested when the first advances were made from depression prices, but bought very freely and continued to buy freely until they were paying double, or almost double. Then they balked and the beginning of the end came. Fortunately the corner was turned before the year ended, and 1900 has gone out with an awakening of trade and a tendency to higher prices in its favor. Thus the iron trade will have rather pleasant recollections of the year, notwithstanding the appalling dullness of the spring and summer. The lesson taught by the experiences of the year, however, should not be forgotten. The temptation to advance prices to excessive figures under the strain of a steadily accelerating demand should be rejected. Manufacturers are now rapidly getting on uncertain ground in the formation of combinations to sustain prices, some of which are of a formidable character because they include the total productive capacity in the line covered. To be in any degree permanent, these combinations must keep prices at reasonable figures and thereby encourage consumption, instead of check it. If this shall be done, with the glorious prospects for 1901 now unfolding before the trade, we have no doubt that the year will prove eminently satisfactory in a sustained volume of business and a comfortable margin of profit.

Electricity vs. Steam for Railroads.

The question whether electricity will supplant steam as a motive force for railways, during the century upon which we are now entering, is one of much interest to engineers in all countries. Too much weight can easily be given to personal opinion on a point of this kind, since what a man thinks on the subject depends largely upon his point of view. The electrical engineers are venturing very confident predictions, but allowing as much as may seem proper for the influence of professional enthusiasm, it would appear that they have the best of the argument in this discussion with the steam engineers. The locomotive is a very interesting piece of machinery, and has been of incalculable value to civilization, but from the limitations of its shape and general proportions it gets less energy out of the fuel it consumes than any other form of engine. The best it will average in ordinary railroad practice is from 4 to 6 per cent. of the theoretical value of the fuel it uses. This is far below the economy attainable through the generation of distributed electrical currents and their conversion into power. The steam locomotive still has a function which is peculiarly its own, and it must be admitted that it meets the requirements of present conditions in the haulage of heavy and infrequent freight trains better than the electro-motor could be expected to do. For the same work the electrically actuated traction engine would have to be made as heavy as the present freight locomotive, and its inconstant demands upon the current, due to varying loads, would be so onerous as to make the cost of installation impracticably high. But with the change of motive power, it is fair to assume that the system of train dispatching would be modified to conform to it, and that the traffic would be so handled as to load the dynamos uniformly. More frequent and lighter trains would move more traffic, with less injury to permanent way and a consequent economy of operating expenses in proportion to tonnage hauled.

English railroad engineers have been somewhat agitated of late by the fact that some of the most practical of their guild have gone over to the other side and taken their place upon the picket line of the electrical engineering camp. For example, the superintendent of the Midland Railway, Mr. Langdon, in a paper read a few days ago before the Institute of Electrical Engineers, gave the public some facts and estimates which are of great interest, especially to shareholders. Taking the 50-mile section of the Midland line between London and Bedford as a basis, Mr. Langdon figures out very plausibly a saving to the company of £250,000 per year in moving its traffic by electricity instead of by steam. The experience of 24 years, carefully tabulated, shows the cost of moving the traffic of this section to be 8.943 pence per train mile. Allowing for every item of the necessarily

costly electrical installation, which would be of the best and most permanent character, Mr. Langdon shows that a liberal estimate of the cost of moving the traffic of this section electrically would be 7.021 pence per train mile. The estimated saving of £250,000 per annum is calculated on the number of trains now run. In all probability it would be much greater. No allowance is made for the increased traffic to be expected when higher speeds and entire freedom from many of the annoyances of railway travel are offered to the public. That trains would increase in number may reasonably be expected, since a frequent service would cost very little more than an infrequent one. In view of this consideration it is not unreasonable to assume that the gain in gross earnings would fully equal the economy in operating expenses. If so, the advantage to the company would in one year pay the estimated cost of the substitution, £10,000 per mile. It might fall a long way short of this and still be a very attractive business proposition to the shareholders.

It is only fair to say, however, that the 50-mile section of the Midland from London to Bedford presents conditions very different from those to be found on many sections of railroad in Great Britain. The problem would be found to have altogether different aspects when there was no suburban travel to accommodate and no local traffic to build up. It follows, therefore, that even comparisons so surprisingly in favor of electricity as Mr. Langdon makes for a part of the Midland system might be extremely misleading if applied to parts of the Kansas Pacific, for example, or even to some of the lines in New York State. This, however, in no sense weakens the argument in favor of electric traction for trunk lines and local roads between populous centers. It means simply that the substitution of electricity for steam will begin where the economies are greatest and the advantages most obvious, and that the locomotive will be pushed gradually back, finding its steadily narrowing field of usefulness in districts where an infrequent train service meets all the requirements of the traffic.

Mr. Langdon's figures are based on electricity generated by dynamos driven by steam engines. This means a large and costly consumption of coal—less, of course, than locomotives would use or waste, but still a great deal. Experience has shown that water power may be utilized to generate currents very cheaply, and that at practicable cost such currents may be distributed, with very little loss, over areas of more than 150 miles radius. Water powers sufficient for the operation of considerable sections of railroad can be found on or near the lines of most of the roads east of the Mississippi, at much less intervals than mark the present practicable limits of current transmission. However great the cost of utilizing such powers, the resulting fuel economies would be so important as to leave no room for discussion as to the wisdom of doing so. To operate a railroad without fuel cost would warrant heavy expenditures in an electrical installation. Many of the available water powers, while ample for the operation of considerable sections of road having a limited traffic, are of no great present value for other purposes, since they are not great enough to warrant such developments as would now attract capital seeking speculative investment in connection with public utilities. A quarter of a century hence they are likely to be almost beyond price. A water power, if continuous, is better than a coal mine, and with the best types of turbines the utilization of head is so complete as to account for every foot-pound not consumed in friction of moving parts, which is minimized to the least expression. In connection with such powers utilized for purposes requiring a variable load which may fluctuate between wide extremes, the storage battery has a function which cannot be claimed for it in connection with electricity generated by steam power. Theoretically, it is the same in one case as in the other, but practically the difference is very great, as will be seen without explanation.

To the traveling public the advantages of electrical traction would be conspicious. The absence of smoke, cinders and asphyxiating vapors would make travel much more comfortable than now. It would also reduce to a minimum the annual fire losses due to the showering of incandescent sparks along the lines of the railroads, when a sharp exhaust causes the locomotive to cough up its half consumed fuel. The amount of property, including crops, timber and buildings, annually destroyed by accidental fires thus caused runs high in the millions, and with litigations and judgments adds to the cost of railway management. With electric traction we can count on higher average speeds, and much better and safer car lighting than can now be provided on any but the show trains, which are run more for advertising purposes than for profits to the railroads. These problems have all been worked out successfully in connection with the trolley systems, which have multiplied so rapidly all over the country. Their application to the steam railroad is simply a question of scale, and in the judgment of traffic experts they present no difficulties.

What now seems to be the imminent development in connection with practical railroading suggests great economic possibilities, and perhaps throws some light upon the difficulty which has been experienced within the past half year in financing one or two of the old locomotive plants, which have been somewhat conspicuously in the market. If this is true, it is only fair to say that it indicates a truer prophetic instinct than capital can usually be credited with. The locomotive probably has at least 25 years more of useful life, but it is quite possible that the number will not increase in future as rapidly as in the past.

Consolidations and Technical Improvements.

The manager of one of the great consolidations has called our attention to one development which has been brought about by the formation of these aggregations. A very progressive man himself in the handling of his own concern, now one of the principal constituent companies, he acknowledges that he can undertake now technical improvements which he would not have dared to consider formerly. Great as his plant was, and backed though it was by ample capital, it was not strong enough to do pioneer or experimental work along the lines of obvious development in manufacturing methods. Now, however, he feels justified in taking up long cherished plans because he can not alone command the best engineering talent in the country and call to his aid all the experience in his own branch, but because, too, the cost of such undertakings is distributed over a very much larger tonnage. When the manufacturing branch of the great consolidations is in the hands of progressive men then organization may be found to accelerate technical progress, a somewhat different outcome of what was generally expected. The idea has taken root that large profits and the absence of the stimulus of the keen competition would lead to stagnation, and that may prove to be the case in some of the consolidations. But in reality it comes down again to the question of management, on the technical side, just as it is the determining factor at the commercial end.

During the discussion of his paper before the British Institute of Mechanical Engineers, Herbert A. Hum-

phrey, who is closely associated with Brunner, Mond & Co., Limited, stated that a gas engine built by the Premier Gas Engine Company of Sandiacre, had obtained results which marked a world's record for thermal efficiency attained with producer gas. The remarkable result was reached of obtaining one indicated horse-power hour for an expenditure of 0.88 pound of cheap bituminous slack of so poor a quality that it only contains 62 per cent. of carbon. It was unfortunate that for the present there is no means of absorbing the full output of this large engine, but Mr. Humphrey felt quite justified in saying that when full load was reached a thermal efficiency of not less than 27 per cent. would be obtained as calculated on the brake horse-power and the lower calorific value of the Mond gas.

McAdamite Aluminum Solder.

The principal difficulty heretofore met with in the working of sheet aluminum into articles of use has been the absence of a thoroughly efficient and reliable solder that could be readily applied by the metal worker with the ordinary means at his disposal. This "long felt want" has at length been supplied, according to W. A. McAdams of 978 Kent avenue, Brooklyn, N. Y., who claims that his McAdamite solder fulfills all the conditions necessary for the purpose of making a strong, neat and durable joint not only between two pieces of aluminum, but between aluminum and any other metal, such as copper, brass, tin, lead or zinc. Specimens of work done by the solder invented by Mr. McAdams, which we have seen, tend to support the claims made for it. The joints are of neat appearance, and are so strong that the sheet metal itself tears apart before the joint is broken. Of course, the test of time has not yet been applied, but the inventor states confidently that the solder will hold as long as the metal to which it is applied lasts. It is of the exact color of aluminum, and is guaranteed not to discolor by time.

The following directions for use given by Mr. McAdams show how the solder should be applied:

Tin or cover the surfaces to be soldered separately with the solder; when the articles are thus covered or tinned, place them together and heat by a copper soldering iron, or other means. Use a copper soldering iron. This iron needs to be as large as possible for the job; for instance, to solder a brass or an aluminum handle onto an aluminum frying pan, use from a 4 to a 6 pound iron. Aluminum articles that weigh 1 ounce or less, a 2-pound iron is large enough.

It is best to scrape, file, scratch or otherwise clean the surfaces to be joined. But it is not actually necessary to do this, as it only takes a little more effort to tin the surfaces if you do not. The work needs to be kept still until the solder sets, which takes longer than one at first would expect. To save time, cold water can be thrown on.

To tin, see that no other solder is upon the nose of the iron; file the nose clean, and melt some McAdamite solder onto it, to tin the iron. Apply the stick of solder to the work in the common way. Then move or rub the iron over the surface to be tinned (or covered) until you see that it has bitten or tinned on—it will take a few moments at first for the heat of the iron to heat up the aluminum enough at the place of tinning. Do not heat the iron red hot; but as one would for common tin and lead solder. It is a saving of time to use two soldering irons, the first to tin the articles and the other to melt them together. Do not use any fluxes. The solder contains its own flux.

The solder, the manufacturer is careful to state, does not flow into a seam or joint, but must be put there. It contains no lead, tin, bismuth, aluminum or phosphorus. Three grades of McAdamite solder are made: No. 1, melting at 430 degrees F., for very thin articles. No. 2, melting at 550 degrees F., the best of the three for general use. No. 3, melting at 610 degrees F., the strongest of them all.

The B. F. Sturtevant Company of Boston, Mass., were recently in receipt of a letter from the Enterprise Foundry Company of Sackville, N. B., which contained this interesting evidence of the endurance of one of their blowers: "We have had one of your No. 6 noiseless blowers in use for 28 years with entire satisfaction, but the blast wheel is now apparently worn out and the left side piece is broken. If we had this left side piece and the blast wheel as shown in your circular it would make the blower all right. Can you furnish this for the No. 6 blower which you were selling in 1872? This blower is driven by two belts, but we fear we have been driving it at too high a speed."

OBITUARY.

SAMUEL P. RICHARDS.

Samuel Potts Richards, at one time a prominent iron founder, died in Camden, N. J., on December 22, aged 87 years. Mr. Richards was born in Batsto, Burlington County, N. J., in 1813. He was the son of Jesse Richards, who conducted an iron foundry at Batsto during the Revolutionary period, and who at that time cast a number of cannon for the American colonists. The deceased graduated from Princeton in 1833, and in 1840 he went to New York, where he engaged in the iron commission business and the construction of water works plants in that State. On the death of his father, in 1854, Mr. Richards returned to Batsto and operated the iron foundry and a glass works, owned by his father, and continued in business until 1873, when he removed to Camden and retired from active business.

GEORGE SMITH.

George Smith, who for 40 years had conducted an iron foundry in Jersey City, N. J., died suddenly on December 22 from heart disease, at his office in that city. Mr. Smith, who was 70 years of age, was a native of New York City.

ALFRED S. REEVES.

Alfred Scull Reeves, eldest son of Paul S. Reeves and a member of the firm of Paul S. Reeves & Sons, brass founders, of Philadelphia, died suddenly on December 18 from heart disease, at his home in that city, in his thirty-ninth year. Mr. Reeves was born and educated in Philadelphia and took a course in mining and metallurgy at the Lehigh University. After leaving college he joined his father's firm and became well known in the business circles of Philadelphia.

JAMES S. DORAN.

James Shreve Doran, superintending and constructing engineer of the International Navigation Company, died on December 17 of apoplexy, at his residence in Philadelphia. He had been in failing health for the last two years, but continued to transact business up to the time of his death. Mr. Doran was born in February, 1834, at Middletown, Bucks County, Pa. When a youth he went to Philadelphia to serve an apprenticeship at the trade of a machinist in the People's Works, and became interested in marine engineering. He became widely known throughout this and other countries as an accepted authority on that subject. During the Civil War Mr. Doran enlisted in the United States Navy, and was on the ironclad "Monitor" during the famous battle with the Confederate ironclad "Merrimac." At the conclusion of the war Mr. Doran resumed marine engineering and had charge of different transatlantic steamships. In 1873 he was made assistant superintendent of the American Line of steamships, and on the death of William Marshall, in 1883, succeeded him as superintending and constructing engineer of the company, who had become the International Navigation Company. Mr. Doran was the inventor of important improvements in marine engines. He superintended the construction of the engines of the steamships "St. Paul" and "St. Louis."

ALBERT P. REGER.

Albert P. Reger of Philadelphia died on December 18 at San Francisco, Cal., of apoplexy. Mr. Reger was 62 years of age and was a native of Philadelphia. For more than 20 years he represented the Waterbury firm of Benedict & Burnham, brass founders, as Philadelphia agent, but retired about eight years ago.

C. T. ORTON.

C. T. Orton died at his home, in Brooklyn, Saturday, December 22. Mr. Orton was well known to the hardware trade from his long connection with it both as trav-

eling salesman and a member of a hardware firm in Boston. He was born in Woodbury, Conn., July 1, 1827. Coming to New York as a young man, he became identified with the Lamson & Goodnow Mfg. Company, who made table cutlery. When this account was transferred to Hermann Boker & Co. many years ago he also became identified with that concern. About six years ago he was stricken with paralysis, since which time he has been entirely out of business. The immediate cause of his death was heart trouble and dropsy.

THOMAS TAYLOR.

Thomas Taylor, president of the Utah Coal & Iron Company, died suddenly at Los Angeles, Cal., on December 10, aged 74 years. Mr. Taylor had been prominent in the industrial development of Utah for half a century.

PERSONAL.

An error crept into the report relative to J. W. Hamilton, formerly with the Hartman Mfg. Company of Ellwood City, Pa. He did not die, as stated, but is filling a responsible position with the management of the Dillon-Griswold Wire Company.

Emil Swensson, member of the Society of Civil Engineers and manager of the Keystone Bridge Works, American Bridge Company, Pittsburgh, has resigned his position. His plans for the future have not yet been definitely decided, except he will take a much needed rest before engaging in work again. Mr. Swensson has been connected with the Keystone Bridge Works for 14 years, starting as a draftsman, then engineer in charge of drafting department, superintendent of Keystone Bridge Works, chief engineer and superintendent, and manager for the American Bridge Company. His experience has been so extensive that he is one of the most thoroughly posted engineers on the design, manufacture and erection of railroad bridges and heavy mill buildings in this country.

David A. Wise, constructing engineer at the Bessemer plant of the Republic Iron & Steel Company, Youngstown, Ohio, has resigned that position in order to accept a similar appointment with the newly organized Youngstown Iron, Sheet & Tube Company. Mr. Wise will superintend the construction of the large new plant that the last named company are erecting at Youngstown.

S. Dunlap, formerly of Youngstown, Ohio, has been appointed general superintendent of the Puget Sound Iron & Steel Company, at Tacoma, Wash.

S. G. Cargill of Winfield, W. Va., has been appointed general manager of the Low Moor Iron Works of Virginia.

August Beltzner has succeeded John Moon as superintendent of the Rockdale, Ill., plant of the American Steel & Wire Company. Mr. Beltzner was formerly superintendent of the old Laidlaw plant at Joliet. Mr. Moon has joined the selling force of the American Steel & Wire Company.

Louis C. Raegener has become a member of the firm of Dickerson & Brown, the style now being Dickerson, Brown & Raegener. The partners are Edward N. Dickerson, Edwin H. Brown and Louis C. Raegener, whose offices are at 141 Broadway. The firm are known throughout the country in connection with patent and trade-mark law.

Miss Kate Gleason of the Gleason Tool Company, Rochester, N. Y., proposes at an early date to start on an ocean trip to San Francisco by way of the Isthmus.

Oliver Williams of Catasauqua, Pa., expects to start for Italy in February.

President Thomas C. Mendenhall of the Worcester Polytechnic Institute of Worcester, Mass., has sent in his resignation to the trustees, to take effect on July 1, failing health being the cause. Dr. Mendenhall was formerly superintendent of the United States Coast and Geodetic Survey at Washington.

Harry E. Rice, superintendent of the American Steel & Wire Company's plant at Waukegan, Ill., has resigned to accept the position of assistant general manager of the Washburn Wire Company, with offices in New York and Providence, R. I.

Col. N. W. Sample of Denver, Col., formerly general superintendent of the Denver & Rio Grande Railway system and now consulting engineer of the Rio Grande Western road, has accepted the position of superintendent of machinery at the Baldwin Locomotive Works in Philadelphia. Col. Sample received his mechanical training in the Baldwin shops before he went West 30 years ago.

F. C. Gedge has been appointed superintendent of the Waukegan works of the American Steel & Wire Company, succeeding H. E. Rice, who resigned to accept a similar position with the Washburn Wire Company. Mr. Gedge was formerly superintendent of the American Company's works at Anderson, Ind., but of late has been assistant manager for the Chicago district. C. F. Blackmer of Waukegan is assistant superintendent.

J. S. McAuliffe, who has been the chemist at the Oxford Furnace, Hackettstown, N. J., since the Empire Steel & Iron Company purchased the plant, has resigned to accept a position of the same kind with the Musconetcong Iron Works at Stanhope, N. J.

J. P. Luce, formerly cashier of the Lalance & Grosjean Mfg. Company's tin plate plant at Harrisburg, Pa., has succeeded Enoch Stanford as manager of the works.

Thomas Fawcus, who has been superintendent of the R. D. Nuttall Company of Pittsburgh, Pa., has severed his connection with that concern. The Fawcus Machine Company have been organized for the manufacture of gears of all kinds and of special machinery. They will also do general machine work.

Clarence S. Bement, of Bement, Miles & Co., Philadelphia, for many years made a collection of minerals which has been pronounced the most complete in the possession of any individual. It is announced that through the munificence of an unnamed donor, the collection has now become the property of the American National Museum of New York.

A movement is on foot among students of Columbia College to raise a fund for a bust of the late Professor Thomas Egleston, whose efforts led to the foundation of the School of Mines. It is stated that William Couper, the sculptor, has practically completed the modeling of the bust.

Frank Samuel of Philadelphia, who was almost the very first in the field as regards export business, and who has built up a large trade in manufactured iron and steel, sails for Europe on the "Kaiser Wilhelm der Grosse."

Wm. H. Thompson, treasurer of the Illinois Steel Company, Chicago, resigned that position December 31 to establish another business connection. Mr. Thompson had been connected with the Illinois Steel Company and their predecessors since 1886, when he entered the service of the Union Steel Company. The heads of the several departments of the company presented him with a set of magnificent silverware as a token of their esteem.

Andrew Carnegie is confined to his room as the result of a slight accident.

C. S. Bennett, who has had charge of the Corrigan Mines at Crystal Falls and elsewhere for years, has resigned and will enter other business. His successor is J. W. Richards, late of the Fayal and still later manager of the Commodore, Mesaba range, for the Corrigan firm. To Crystal Falls with him will go Captain J. P. Welsh, of the Stevenson Mine, and Captain H. Tregillis, of the Fayal.

B. F. Harper, late with the American Steel Hoop Company, has connected himself in a prominent way with the Republic Iron & Steel Company, Chicago, as sales agent. Mr. Harper brings with his new connection an experience in the iron and steel trade extending over a period of 23 years.

Favorable reports are being received concerning William Runkle, president of the Warren Foundry & Machine Company, who has for the last four weeks suffered from an attack of typhoid fever.

Atikokan Range Exploration.

DULUTH, MINN., December 30, 1900.—E. F. Bradt, late of the Minnesota Iron Company's explorations on the Menominee range, has been in Duluth the few days past receiving instructions as to the new and important work he is to undertake. He has now gone to the Atikokan range, where he is to begin explorations at once for the American Mining Company on the McKellar-Hunter locations, which have been under preliminary explorations for a year or so. The American Mining Company have taken options on these locations, and will explore extensively during the present winter and coming spring. Their option is for direct purchase of the Hunters, who have options from the McKellars for about $350,000. Full descriptions of the work so far done here have been given in this correspondence as the work has progressed from time to time. The range is now available, for the Ontario & Rainy River road is building along the slope of the outcrop from Lake Superior, 120 miles away, and is within about 40 miles of the range with its rails. It is stated by the officers of the road, who have recently been in this section, and from whom the information comes, that they will give a rate to Lake of ½ cent per ton per mile. Dock and other facilities will be provided at Port Arthur, 200 miles northeast from Duluth, and it is hoped that there will be a differential in favor of the new port in Lake rates. This is hardly likely to be given, however, for various reasons, as the rate to Port Arthur will probably not vary from that from the head of the Lake. Seventy-cent rail is at present a little better than Mesaba rates, but there is the 40-cent duty to contend with and the fact that the ores are magnetic. It may be set down as a fact that a thorough trial will be given the new range at last. This property is what has been credited for some time to the Corrigan interest and with which this correspondence has said all along that that interest had nothing to do with it.

The Vrooman Foundry Riddle.

The special feature of the foundry riddle manufactured by H. S. Vrooman, 220 West Twentieth street, Chicago, is the corrugation of the wire cloth bottom in concentric circles. This increases the screening surface and adds rigidity to the bottom. The screen as thus made riddles sand faster than one made of flat cloth, from the fact that the sand strikes the corrugations and passes rapidly through the meshes instead of a large part sliding over them, as in the old style of riddle. The corrugations also spread the sand over a greater screening surface. It has been demonstrated that the corrugations increase the working capacity of a riddle fully 50 per cent.

The Monell Open Hearth Patent.—The Carnegie Steel Company have obtained control of a valuable patent covering an important innovation in steel manufacture. It is an improvement on a process recently patented by Ambrose Monell. In the latter process molten pig iron is charged into a basic open hearth furnace containing iron oxide and lime, and at an early stage of the process, while the iron is at a comparatively low temperature, most of the slag is withdrawn, taking with it nearly all the phosphorus in the iron. Heating of the bath of the metal is then continued and the carbon oxidized and reduced to the point at which the metal is to be tapped. Changes of the newer patents greatly expedite and improve the process. Better results are secured by employing as the oxygen compound which is charged into the furnace, the cinder from heating furnaces or the scale from rolling mills, instead of iron ore. This is the feature of the present improvement.

The Carnegie Scale.—The Carnegie Steel Company have notified the employees at their Homestead Steel Works, Duquesne Steel Works and blast furnaces, Edgar Thomson Steel Works and blast furnaces, Upper and Lower Union Mills, and, in fact, all employees, that there will be no reduction in the wage rate in 1901 over last year. From the fact that the company gave notice in the latter part of September of their desire to terminate the wage scale which expired on December 31, the men thought a reduction was coming. But this is not the case, as the same rate of wages will be continued for this year as was in force last year. Every works owned by the Carnegie Steel Company is in operation to utmost capacity, and on some lines, such as plates, the company have orders to take their output for the next two or three months.

The Perrin Tube Patent.

There has been considerable talk during the last week regarding the formation of a $150,000,000 company which is to enter the steel tube field. Some of the reports had it that the company were to be another consolidation in the tube industry. This is pure nonsense, but we are informed on excellent authority that there are operations under way looking toward the formation of a company for the purpose of producing iron tubes by a new process. Just what the outcome of the matter will be and the extent of the operation cannot be determined as yet, as the matter is still in the stages of investigation. The new process is patented in all the large countries and controlled by Perrins, Limited, of Birmingham, England. According to the statements furnished by the latter company and a number of English engineers, the new method is said to be a very important one. These statements have been of sufficient significance to interest several prominent American financiers and steel makers. It is said that the method is now being successfully employed in England, the company controlling the patents receiving a royalty from various of the large tube manufacturers for the privilege of using the process. An American syndicate headed by E. R. Chapman of New York have secured a contract from the English company owning the patents allowing them the right of manufacturing under the patents in this country. Mr. Chapman has for the last 15 years been identified with the banking house of Moore & Schley of New York City. On Monday last he severed his connection with the latter concern and is now the president of E. R. Chapman & Co., with offices at 80 Broadway.

The new process, it is said, is very much simpler and less costly than the present butt and lap welded methods. It is also said to produce a tube capable of standing a much greater pressure than those made here at present. Under the new process, the patentees claim, the completed tube can be produced at about the cost of the skelp employed in the ordinary method. The new process allows for the production of the finished tube in two heats and two operations. It is asserted that tubes made on the new plan with the lower grades of iron will withstand a pressure of 8000 pounds per square inch, as compared with 300 to 400 pounds in the case of the butt-welded tube and about 2000 pounds for the lap welded tube.

Two engineers are now *en route* to Europe, where they will make a thorough investigation as to the actual merits of the process. They will ascertain whether the new process does in practice what has been claimed for it by the English representatives and engineers who have interested the American capitalists. If the reports of the American engineers are satisfactory large works will be erected in this country for the production of tubes under the American patents. Several large steel manufacturers in this country are said to have expressed a willingness to erect plants for manufacturing the tubes, and a rumor purports that a gentleman very prominent in the steel industry of this country has intimated that he may send a very prominent Pittsburgh engineer and expert to investigate the process.

The formation of a company to work under the patents in this country depends entirely upon the reports of the engineers who are making the investigation. If formed, it is said, the company will be capitalized at from $30,000,000 to $50,000,000. Among those who have been mentioned as being connected with Mr. Chapman in the financial end of the project are W. W. Gibbs, William L. Elkins, P. H. B. Widener and Thomas Dolan, all of Philadelphia and well known in electrical traction and lighting circles.

MANUFACTURING.

Iron and Steel.

Marshall Furnace, at Newport, Pa., has blown in.

The Youngstown Steel Company, at Youngstown, Ohio, started up their furnace on Thursday, December 27. The product is washed metal running low in phosphorus.

Mary Furnace of the Ohio Iron & Steel Company, at Lowellville, Ohio, which has been closed for five weeks, was expected to blow in on January 3. This furnace turns out Mary Scotch pig iron.

The American Tin Plate Company have installed in the Shenango and Greer works, at New Castle, Pa., 30 frictionless charging machines made by Jas. D. Swindell, consulting engineer, of Pittsburgh. We are advised that these machines are giving entire satisfaction.

The Common Pleas Court in Philadelphia has granted an injunction on the motion of the Blue Mountain Iron & Steel Company restraining Lawrence J. Morris from proceeding to advertise for sale a furnace property in Frederick County, Md., known as the Catoctin Iron Works.

The Board of Directors of the Standard Steel Works, Burnham, Pa., have decided not to erect the building contemplated some time ago. No extensive improvements will be made at present and any reports to the contrary are erroneous.

The Minerva Pig Iron Company, Milwaukee, Wis., will resume operations at their plant January 7. The blast furnace has been banked for several months.

The Taylor Iron & Steel Company of High Bridge, N. J., are putting in a new side track and building a new bridge in order to give the company better shipping facilities.

The Eastern Forge Company, Boston, Mass., successors to the Nashua Iron & Steel Company, are considerably increasing the equipment of their plant at Nashua, N. H. A 3-ton hammer will be installed as soon as possible. An electric light generator has been added to the plant and a Sturtevant blower to the machinery, both of which will be run by a new Rollins engine. The company make a specialty of fully finished heavy work.

The Saxton Furnace Company have successfully blown in their blast furnace at Saxton, Pa. Fires were lighted on the 10th ult. and a good grade of iron is now being produced. This furnace, which is of 180 tons per day capacity, has been out of blast for nearly ten years and has been entirely remodeled and equipped by the above company.

The 119 and the 33-inch plate mills at the Homestead Steel Works were started last week. Extensive improvements were made at both mills.

Machinery.

The Carter & Hakes Machine Company, Winsted, Conn., manufacturers of milling machines, are just putting on the market their new column miller, which they state is designed particularly for light milling. Because of its light weight, stiffness and general plan, it is spoken of as a machine adapted for the use of jobbers. The machine has a large range, having an automatic feed table of 24 inches cross motion in line with spindle 5¾ inches and weighs 950 pounds. Owing to a large increase in their business the company will enlarge their plant in the near future.

Preparations have begun for the erection of a new boiler factory for the McAleenan Boiler Company, Peoria, Ill., who now have a very large plant. The factory will be equipped with the latest appliances for boiler manufacturing.

The Butler Street Foundry & Iron Company, Chicago, have lately installed a new 12-ton crane and have equipped their finishing shop with new tools. The melting capacity of the foundry has been increased to 10 tons per day. They are now making contractors' and builders' supplies, gray iron castings and architectural work. They report a decrease of business in 1900, but a small increase in December over that of the last few months and the corresponding month of 1899.

The Western Foundry Company, South Albany avenue and Thirty-sixth street, Chicago, whose works were recently destroyed by fire, have erected a new and substantial plant. They have increased their capital from $30,000 to $50,000 and correspondingly enlarged their operations. They now have two foundries, each 107 x 210 feet; a machine shop and shipping room, 50 x 140 feet; an office and pattern room, 50 x 75 feet, and a mill room, 45 x 50 feet. These improvements have increased their output of light gray iron castings to 30 tons per day. They report an increase in business of 10 per cent. in 1900 over that of 1899, and an increase of 25 per cent. in December over that of the previous months and of the corresponding time in 1899.

The Stockham Mfg. Company, Forty-sixth street and Grand avenue, Chicago, have made many additions to their plant during the last year. They have built a malleable foundry, 100 x 300 feet, with a capacity of 30 tons per day, and an annealing house, 165 x 186 feet. The gray iron foundry has been increased from 80 x 120 feet to 135 x 150 feet, enlarging its capacity 30 tons per day; the mill room from 30 x 40 feet to 40 x 120 feet, and the electric plant has been increased 300 per cent., thus affording ample light and power for the whole plant. A new office building has also been added. Besides equipping these additions with the latest appliances they have installed a new 140 horse-power Armington & Simms engine, a new cupola, two large lathes, six large drill presses and new tumbling barrels. The whole capacity of the plant has been increased 50 per cent. The Stockham works have excellent facilities for shipping, lying on the Belt Railroad, as well as the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul railroads.

The S. M. York Machinery Company, a new corporation, have purchased the entire stock of the S. M. York Company and also the machinery department of the W. M. Pattison Supply Company, and will continue the business under practically the same management as heretofore at 42, 44 and 46 South Water street, Cleveland, Ohio, retaining all the agencies formerly controlled by the S. M. York Company. The new company are officered as follows: W. M. Pattison, president; Arthur Jones, vice-president; W. H. Smith, treasurer; C. N. Hess, secretary. With increased capital and enlarged stock, they will be in a better position than ever to serve their patrons.

The Thomas K. Carey & Bros. Company, Baltimore, Md., incorporated under the laws of the State of West Virginia, have been reincorporated under the laws of the State of Maryland. The new company, who are incorporated under the name of the Carey Machinery & Supply Company of Baltimore City, have acquired all the assets of the old company and assumed all their liabilities, and the business will be continued as heretofore, at 26 Light street, with the same officers and employees.

The Oil Well Supply Company, Oswego, N. Y., are extending their plant north to the R. W. & O. Railroad station. They expect to have the boiler shop finished early in January, and when all improvements now under way will have been completed the works will be 478 feet long. The demand for their Tonkin water tube boiler has compelled the company to increase their facilities.

The plant of the United States Machine Company, at South Williamsport, Pa., was entirely destroyed by fire December 22, entailing a loss of about $20,000 and throwing 25 men out of employment. The company manufacture wood working machinery and expect to rebuild their plant. Their office having been consumed, they request manufacturers to send them catalogues and prices of all tools and supplies in the machine business.

The Manchester Locomotive Works, Manchester, N. H., manufacturers of the Amoskeag steam fire engine, have become identified with the International Fire Engine Company, and hereafter the Amoskeag steamer will be handled by that company. The Manchester Company preserve their identity and will continue to manufacture the Amoskeag steamers. The new combination does not affect the locomotive department of the works, which is entirely independent of any combination.

The Raymond Mfg. Company, Middletown, Pa., manufacturers of machinery castings, steam heating apparatus, &c., have purchased a 15-ton electrical traveling crane and are installing the same in their foundry, and expect to have it in position by January 15. They are also purchasing and installing at the present time a complete air system throughout their entire works for chipping, riveting boilers, caiking boilers, cleaning castings and ramming large molds in their foundry. They have also greatly enlarged their foundry and are improving it in many other ways.

F. E. Hitchings, Portland, Maine, successor to Jones & Hitchings, is building six excelsior machines for L. P. Hawkins of South Paris.

The Manitowoc Steam Boiler Works, Manitowoc, Wis., have increased their capital stock from $10,000 to $100,000.

The J. H. McLain Machine Company, Canton, Ohio, have built an addition, 15 x 30 feet, to their plant.

G. W. Sitten of Johnson City, Tenn., will establish a foundry at Bristol to replace the city foundry and machine works which were recently burned.

The Freeman Foundry & Machine Works, Joplin, Mo., will erect a new foundry and machine shop which will cover an entire block on Fourteenth street, extending back 80 feet.

The Crescent Machine Company, Leetonia, Ohio, will erect a machine shop 46 x 92 feet. It will be three stories in hight and will have a gravel roof, electric light and a metal ceiling in the office. The concern have a dynamo, which they may decide to use, or they may be obliged to put in a larger one. The erection of this building is made necessary owing to their business having entirely outgrown their capacity. In consequence of this some of their orders have suffered delay. The concern are manufacturers of wood working machinery and make a specialty of band saw machines.

The Wagner-Palmros Mfg. Company, Fairmont, W. Va., manufacturers of coal mining machinery, are to erect a machine shop which, it is understood, will be 100 x 250 feet.

The Southern Engine & Boiler Works, Jackson, Tenn., will build a new machine shop, 70 x 334 feet, new foundry, warehouse, blacksmith shop, &c. The machine shop and foundry will be equipped with electric traveling cranes and all latest improvements in machine shop practice; hence they will be in the market for quite a lot of new machinery, electric cranes, lathes, planers, &c.

The American Iron Works, Des Moines, Iowa, manufacturers of iron castings, engines, boilers, &c., have added two lathes of latest designs to their machine shop and a 1600-pound steam hammer to their forge works. The company are now able to handle large forgings.

The Warren City Boiler Works, Warren, Ohio, intend putting up a new building, 130 feet wide and 120 feet long, which they expect to have completed within 60 days. The company also intend making other improvements in the near future. Their present quarters have for a long time been too small for their increased business.

The new erecting shop of the Cleveland Punch & Shear Company, which has been in process of construction for some time past, is now nearly completed, and soon after the first of the year the company expect to be in shape to make better deliveries on tools in their line. The new shop will have a complete electrical equipment, including electric traveling crane. The company have recently made shipment of tools as follows: 25-foot plate planer to the National Tube Company, McKeesport, Pa.; two 19-inch throat punches to S. B. Rheam & Co., Pittsburgh, Pa.; one special I-beam punch with 21-inch throat to the Brown-Ketcham Iron Works, Indianapolis, Ind.; one 44-inch throat punch on the order of Pratt & Whitney Company of New York; one 30-inch throat punch, one 10-inch throat punch and one 12-foot radial drill to the Browning Engineering Company of Collingwood, Ohio; one bending and straightening machine to the Meehan Boiler & Construction Company, Lowellville, Ohio; one 50-inch rotary planer with 12-foot bed, and a 15-foot radial drill to the Hay Foundry & Iron Works, Newark, N. J., and one No. 5 bar shear, capacity to cut 4 x 4 inch billets cold, to the J. B. Carr Company, Troy, N. Y.

The Bunnell Machinery Company, Chicago, Ill., was started as a copartnership about a year ago. After meeting with some success in the sale of the Bunnell stone crusher, capitalists were interested, with the result that application has recently been made for a charter in Illinois. O. W. Meysenburg, late of the Wells French Company, is the principal stockholder. They propose manufacturing a full line of earth handling machinery, and are at present pushing the Bunnell automobile steam grader and ditcher and the Bunnell stone crusher. The stock of the company has been fully subscribed and will be fully paid in as soon as the charter is issued. The company expect to build a plant in the near future.

The Hammond Rolling Mill Company.—The Hammond Rolling Mill Company have leased the works at Hammond, Ind., formerly operated by the Lakeside Nail Company. The plant consisted originally of four gas heating furnaces, one train of 24-inch rolls and one train of 22-inch rolls, which were used for rolling nail plate. It has been completely reconstructed, the company putting in three new trains of rolls. One of these is a 10-inch train, another 8-inch and the third is a 20-inch muck train. The present capacity of the works is 125 tons a day. The company may make some additional improvements toward spring, and increase the capacity of the works 50 tons. They will have the mill in operation this week. They have purchased a good stock of scrap iron, probably sufficient for three months, and have already taken orders for bar iron to a proportionate extent. John D. Briggs is president, and Millard S. Denslow is secretary and treasurer. The city office of the company is at 188 Madison street, Chicago.

The Bridge Workers' Strike.—(*By Telegraph*)—PITTSBURGH, PA., January 2, 1901.—About 1000 bridge and structural workers in the Pittsburgh district went on strike Monday morning, January 1, to enforce their demands for an advance from 27 cents an hour for a day of ten hours to 33 1-3 cents an hour and a nine-hour day. The concerns affected by the strike are the American Bridge Company, with five plants in the Pittsburgh district; Fort Pitt Bridge Company, Columbia Bridge Company, McClintic-Marshall Construction Company and Pittsburgh Steel Construction Company. A number of large jobs in Pittsburgh are held up by the strike, among these being the new Union Depot, the Carrie furnaces and the new Hot Metal Bridge.

A convention of the traveling representatives and the managers of the various offices of the Buffalo Forge Company was commenced at Buffalo on Wednesday, January 2. The sessions will extend over the balance of the week. The men will discuss business methods and a series of prizes has been offered to those suggesting the best ideas and methods of taking care of the trade.

Bridge Across Sydney Harbor. An American Tender the Lowest.—The tenders for the construction of a bridge across Sydney Harbor were recently opened in Sydney. In all, 22 designs were received, and the tender of the Union Bridge Company, of New York, is understood to be the lowest. The estimates varied from £634,625 to £2,927,236. The Union Bridge Company have had past experience of Australian requirements, having designed and built, some ten years ago, the bridge across the Hawkesbury River, on the main line from Sydney northward, the greatest feat in bridge building this country has yet seen. Official acceptance of any tender in connection with the Sydney bridge cannot be made for some time yet, as there are some 350 plans in connection with the various tenders to be examined and adjudicated upon.

The Republic Iron & Steel Company.—The Republic Iron & Steel Company are greatly annoyed by persistent reports that they are dismantling their works at Springfield, Ill., which were formerly owned by the Springfield Iron Company. No immediate prospect exists of operating these works, but it is not the intention of the company to abandon or dismantle them. They have for some time had a large stock of scrap at the plant which was exposed to the weather, and recently concluded to remove it to others of their plants which are now running. This has probably given color to the rumor that the works are being abandoned. Not a roll, however, has been taken out of the mills, nor has any part of the plant been torn up.

A Carnegie Land Purchase.—The Carnegie Steel Company have bought about 700 acres of land at McKean Station, on the Allegheny Valley Railroad, about 25 miles from Pittsburgh. We are advised that the purpose of this purchase is to have as a reserve a large tract of land for the certain growth of the Carnegie Works. In buying this tract the Carnegie Steel Company have obtained one of the finest manufacturing sites near Pittsburgh. The fine veins of coal underlay the whole upland part of the site. The exact use to which the ground will be put has not been determined.

A New Shafting Plant.—The Republic Iron & Steel Company, Youngstown, Ohio, state that their new shafting works at the Brown-Bonnell plant will be started up within the next two weeks, just as soon as the machinery has been installed. This new shafting works is equipped with modern machinery and is an up to date plant in every respect.

Blast Furnace Wages in the Valleys.—Notices have been posted at all the blast furnaces in the Mahoning and Shenango valleys of a reduction in wages of about 15 per cent., to take effect February 1. The wages of bottom fillers and helpers, which heretofore have been $1.90 a day, will be reduced to $1.65 per day. The dullness in the pig iron trade and the low prices ruling for iron are given as the causes for the reduction in wages.

The McClintic-Marshall Construction Company, Park Building, Pittsburgh, have recently taken some very large contracts. Among these is a bridge across the Pittsburgh Junction Railroad at Ben Vente; a shop for the Brooks Locomotive Works, 58 x 396 feet, and a slate storage building, 58 x 216 feet. The concern have just secured a contract for about 8000 tons of structural steel for the Marshall Field & Co. Building at Chicago, for which D. H. Burnham & Co. are engineers. The McClintic-Marshall Construction Company are rolling at their works at Pottstown, Pa., material for their new plant to be erected in the spring at Rankin Station, Pa.

The Sharon Steel Company, Sharon, Pa., advise us that they expect to add ten hot mills to their tin plate plant, making it a 20-mill plant. They also expect to build a skelp mill with a capacity of approximately 300 tons a day and a pipe mill, which will convert all this skelp into finished pipe.

The Iron and Metal Trades.

The American Iron trade enters upon the new year under very auspicious conditions. A large tonnage has been booked in nearly all branches, and that generally at remunerative prices. So far as the home demand is concerned, the outlook is exceptionally good. The only dark spot is that growing out of the poor chances of a large export business this year.

From the producing end the position will be well defined during the current month, the open questions relating to the cost of Coke and of Iron Ore. Relative to the former some very erroneous impressions have been created through the reports of a sharp struggle between rival Connellsville interests. As a matter of fact, what cutting of prices has occurred has taken place between the makers in outside districts. Although large contracts have been placed for Connellsville Coke, we do not hear of anything lower than $1.75 per net ton at oven.

Just what will be done in regard to Lake Superior Iron Ore is still a matter of conjecture. Opinion seems to be divided even among those who mine and convert their own raw material into finished goods, who control the situation. It might at the first blush look clever to hold Ore high, to embarrass Steel makers and rolling mills who must buy in the open market. This has another side, however, and that is that by putting a high nominal price on their Ores the large Steel interests push up all the costs which depend upon sliding scales, notably royalties; create dissatisfaction in the ranks of labor and may bring about a troublesome situation so far as transportation is concerned.

The great Steel interests in the Central West have eliminated the labor question in the Steel works and rolling mills by centinuing the present scales. This is true of the National Steel Company also, there being no truth in the report that wages have been reduced 10 per cent. In that direction then no disturbances need be feared, and the men get their share of the advantages due to co-operation between the companies in holding prices steady and at a remunerative level.

The reduction of wages of 15 per cent. at the blast furnaces of the Valleys is the natural outcome of the serious position in which the outside merchant furnaces producing Bessemer Pig find themselves.

The Rail makers will probably advance prices either $1 or $2 per ton at their next meeting, that step having been urged for some time past by influential members. During the week there have been sales aggregating fully 150,000 tons, and it is estimated that the mills now have orders for 1,300,000 tons for 1901 delivery on their books.

The Billet makers are to have another meeting on the 4th inst.

A good many orders have been placed for Structural Material lately. A Pittsbugh firm have taken the contract for 8000 tons for the Marshall Field Building in Chicago. The American Bridge Company have closed for 4000 tons for the new Astor Hotel, 1500 tons for a department store in Newark, and 4000 tons for track elevation and pin connected bridges for the Chicago & Alton Railroad. It may be interesting to note that the Union Bridge Company, a constituent concern of the American Bridge Company, are the lowest bidders on a large bridge for Sydney Harbor, Australia.

In shipbuilding the American Shipbuilding Company have secured two additional Lake freighters.

The outlook for export for Pig Iron, Billets and all cruder corms is decidedly discouraging. It will take the foreigners some time to get over their scare, until they realize that the market here has changed. The financial situation is unfavorable, notably in Germany, and prices broad have come down with a run. For some months deliveries on old orders will go forward, but then, unless there are new developments, we may expect a sharp decline.

A Comparison of Prices.

At date, one week, one month and one year previous.

Advances Over the Previous Month in Heavy Type. Declines in Italics.

	Jan. 2, 1901.	Dec. 26, 1900.	Dec. 5, 1900.	Jan. 3 1900.
PIG IRON:				
Foundry Pig, No. 2, Standard, Philadelphia	$15.50	$15.50	$15.50	$23.25
Foundry Pig, No. 2, Southern, Cincinnati	13.75	13.75	13.75	20.50
Foundry Pig, No. 2, Local, Chicago.	**15.00**	15.00	14.50	23.50
Bessemer Pig, Pittsburgh	*13.25*	13.25	13.50	24.90
Gray Forge, Pittsburgh	13.25	13.25	13.25	21.25
Lake Superior Charcoal, Chicago	19.50	19.50	19.50	25.50
BILLETS, RAILS, ETC.:				
Steel Billets, Pittsburgh	19.75	19.75	19.75	35.00
Steel Billets, Philadelphia	21.00	21.00	21.00	37.50
Steel Billets, Chicago	20.75	20.75	20.75	nom.
Steel Rails, Heavy, Eastern Mill	26.00	26.00	26.00	35.00
Spikes, Tidewater	1.50	1.50	1.50	2.65
Splice Bars, Tidewater	1.85	1.85	1.85	2.80
OLD MATERIAL:				
O. Steel Rails, Chicago	11.00	11.00	11.00	19.00
O. Steel Rails, Philadelphia	16.00	16.00	16.00	21.00
O. Iron Rails, Chicago	17.50	17.50	17.50	25.00
O. Iron Rails, Philadelphia	**18.00**	18.00	17.50	27.00
O. Car Wheels, Chicago.	*15.50*	15.50	16.00	21.00
O. Car Wheels, Philadelphia	17;00	17.00	17.00	20.50
Heavy Steel Scrap, Chicago	11.00	11.00	11.00	18.00
FINISHED IRON AND STEEL:				
Refined Iron Bars, Philadelphia	1.45	1.45	1.45	2.05
Common Iron Bars, Chicago	**1.45**	1.45	1.35	2.15
Common Iron Bars, Youngstown	1.30	1.30	1.30	.....
Steel Bars, Tidewater	1.40	1.40	1.40	2.35
Steel Bars, Pittsburgh	1.25	1.25	1.25	2.20
Tank Plates, Tidewater	**1.55**	1.55	1.48	2.40
Tank Plates, Pittsburgh	**1.40**	1.40	1.35	2.25
Beams, Tidewater	1.65	1.65	1.65	2.40
Beams, Pittsburgh	1.50	1.50	1.50	2.25
Angles, Tidewater	1.55	1.55	1.55	2.40
Angles, Pittsburgh	1.40	1.40	1.40	2.25
Skelp, Grooved Iron, Pittsburgh	**1.50**	1.55	1.45	1.90
Skelp, Sheared Iron, Pittsburgh	1.55	1.60	1.55	2.30
Sheets, No. 27, Pittsburgh	*2.85*	2.85	2.90	2.80
Barb Wire, f.o.b. Pittsburgh	2.80	2.80	2.80	3.80
Wire Nails, f.o.b. Pittsburgh	2.20	2.20	2.20	3.20
Cut Nails, Mill	1.95	1.95	1.95	2.50
METALS:				
Copper, New York	**17.00**	17.00	16.75	16.00
Spelter, St. Louis	*3.95*	4.00	4.12½	4.35
Lead, New York	4.37½	4.37½	4.37½	4.70
Lead, St. Louis	4.20	4.20	4.20	4.65
Tin, New York	*26.75*	28.00	27.62½	25.50
Antimony, Hallett, New York	*9.25*	9.25	9.50	9.75
Nickel, New York	55.00	55.00	55.00	38.00
Tin Plate, Domestic Bessemer, 100 lbs., New York	4.19	4.19	4.19	4.84

Chicago.

Office of *The Iron Age*, 1205 Fisher Building, CHICAGO, December 31, 1901.

Trade conditions are universally considered as on a sounder basis than a year ago. Manufacturers are well supplied with orders but consumers are not loaded with Iron and Steel which they may not want. The outlook for business is exceedingly promising, and it is confidently expected that a heavy demand will be enjoyed as soon as the holiday period has ended. Some branches of business in fact are even now finding no serious falling off.

Pig Iron.—It is the rare exception to find active buying at this time of the year. Trade is quiet all along the line. Some good inquiries are, however, coming up and everything is favorable for a good trade in the near future. Furnace companies are evidently well satisfied with conditions now existing and making no effort to stimulate buying. Quotations are as follows:

Lake Superior Charcoal	$19.50 to $20.00
Local Coke Foundry, No. 1	15.50 to 16.00
Local Coke Foundry No. 2	15.00 to 15.50
Local Coke Foundry, No. 3	14.50 to 15.00
Local Scotch, No. 1	15.50 to 16.25
Ohio Strong Softeners, No. 1	16.25 to 16.50
Southern Silvery, according to Silicon	16.10 to 16.60
Southern Coke, No. 1	15.35 to 15.85
Southern Coke, No. 2	14.60 to 15.10
Southern Coke, No. 3	14.10 to 14.60
Southern Coke, No. 1 Soft	15.35 to 15.85
Southern Coke, No. 2 Soft	14.60 to 15.10
Foundry Forge	13.60 to 14.10
Gray Forge and Mottled	13.60 to 14.10
Southern Charcoal Softeners, according to Silicon	15.00 to 17.00
Tennessee Silicon Pig	17.00 to 18.50
Alabama and Georgia Car Wheel	20.00 to 20.35
Malleable Bessemer	15.00 to 15.50
Standard Bessemer	15.00 to 15.50
Jackson County and Kentucky Silvery, 8 per cent. Silicon	17.50 to 18.50

Bars.—The leading manufacturers of Bars say that the old year is going out in a blaze of glory. Plenty of business has been booked during the week, the buying being well distributed over consuming interests. Buyers at prsent are not contracting for large tonnages, but are persistently in the market covering their requirements. Mill Shipments of Common Iron are firm at 1.45c. to 1.50c., Soft Steel Bars, 1.40c. to 1.45c., and Hoops, 1.95c., base, Chicago. Jobbers have had no serious diminution in their trade. Prices on small lots from store are maintained at 1.75c. to 1.80c. for Common Iron, 1.60c. to 1.70c. for Steel Bars and 2c. to 2.20c. for Hoops.

Car Material.—It is surprising that manufacturers of cars and railroad supplies generally find it necessary to purchase additional quantities of material without regard to inventory season. Trade of this kind has been very good during the week.

Structural Material.—The contract for the erection of the Marshall Field Building, taking 7000 tons, has been awarded to the Marshall-McClintic Company, Pittsburgh. Other building projects are steadily taking shape, and contracts are likely to be closed shortly. A moderate trade is doing in Structural Material in a general way. The tonnage for the month runs up to very good figures. Mill shipments are quoted as follows: Beams, Channels and Zees, 15 inches and under, 1.65c.; 18 inches and over, 1.75c.; Angles, 3 inches and over, 1.55c.; Angles, under 3 inches, 1.55c. rates; Tees, 1.70c.; Universal Plates, 1.55c. to 1.60c. Small lots of Beams and Channels from local yards are quoted at 2.10c. to 2.25c.; Angles, 1.60c. to 1.70c. rates, and Tees, 1.75c. to 1.85c.

Plates.—A better demand than expected is reported for mill shipments. Orders for a good round tonnage has been placed during the week, and more inquiries are under negotiation. Store trade is quiet. Mill shipments of Tank Plate, ¼-inch and heavier, in carload lots, are quoted at 1.55c. to 1.60c., Chicago; Flange, 1.65c.; Marine, 1.75c. Jobbers quote small lots from store at 1.80c. to 2c. for Tank, and 2c. to 2.10c. for Flange.

Sheets.—The demand shows no indication of abating. Manufacturing consumers and jobbers have been freely ordering, and the business in mill shipments placed during the week has run up to a large aggregate. The Sheet trade is probably heavier than ever before known. Stocks of both Black and Galvanized are light all through the West, and local jobbers are consequently receiving orders from an unusual class of buyers. Mill shipments of No. 27 Black are quoted at 3.15c., Chicago, while Galvanized Sheets are held at 70 and 7½ off. Small lots from stock are quoted at 3.30c. to 3.40c. for No. 27 Black, 2.40c. for No. 16, 2.30c. for No. 14, 2.10c. for No. 12, 2c. for Blue Annealed No. 10, and 70 off for Galvanized. The Galvanized Sheet quotations in the last week's report were a manifest misprint.

Merchant Pipe.—Conditions are unchanged. The demand is very good. Local manufacturing interests are not looking for any immediate change in prices. Manufacturers' prices, random lengths, are as follows:

	In carloads.		Less than carloads.	
	Blk.	Galvd.	Blk.	Galvd.
⅛ to ½ inch and 11 to 12 inches	59.2	46.2	54.9	40.9
¾ to 10 inches	66.7	53.3	61.9	49.9

Boiler tubes are firm with a moderate demand. Quotations are continued as follows:

	Steel.	Iron.
1 to 2¼ inches, inclusive	50	40
2½ inches	50	42½
2¾ to 5 inches	60	50

Rails and Track Supplies.—The Rail trade is in very satisfactory condition. Manufacturers are steadily booking good orders. The business for the past week covered upward of 30,000 tons and a very large tonnage is still in sight and will soon be placed under contract. Inquiries are coming up from new projects, including numerous electric lines. It is expected that the Rail output of the coming year will be up to if not in excess of that of any previous year. Prices of Rails have not been changed, but an advance may be expected at an early day. Heavy sections of Steel Rails are quoted at $26 and Light Sections at $25.50 to $28, according to weight. Track Supplies continue active, with Splice Bars quoted at 1.40c.; Spikes, 1.65c. to 1.75c.; Track Bolts, with Hexagon Nuts, 2.55c., and Square Nuts, 2.40c.

Merchant Steel.—Manufacturers are having an excellent trade for the season. A good percentage of consumers who had previously placed season contracts find it necessary to purchase additional quantities. They find prices higher than their original figures, but the mills are refusing to book orders except at present market rates. Mill shipments, Chicago delivery, are quoted as follows: Smooth Fnished Machinery Steel, 1.75c. to 1.90c.; Smooth Finished Tire, 1.75c. to 1.95c.; Open Hearth Spring Steel, 2.15c. to 2.40c.; Toe Calk, 2.40c. to 2.60c.; Sleigh Shoe, 1.70c. to 1.90c.; Cutter Shoe, 2.40c. to 2.60c.; Cold Rolled Shafting, 57 off. Ordinary grades of Crucible Tool Steel are quoted at 6c. to 7c.; Specials, 13c. upward.

Old Material.—The market shows a weakening tendency, but without changes in quotations. Dealers are now more disposed to sell their stock who had been holding for higher prices. Considerably more business has therefore been done. The following are approximate quotations per gross ton:

Old Iron Rails	$17.50 to $18.50
Old Steel Rails, mixed lengths	11.00 to 11.50
Old Steel Rails, long lengths	14.00 to 15.00
Relaying Rails	20.00 to 22.00
Old Car Wheels	15.50 to 16.00
Heavy Melting Steel Scrap	11.00 to 11.50
Mixed Steel	9.00 to 9.50
Iron Fish Plates	17.50 to 18.00
Steel or mixed do	10.00 to 10.50
Iron Car Axles	19.50 to 20.00
Steel Car Axles	16.00 to 16.50
No. 1 Railroad Wrought	15.50 to 16.00
No. 2 Railroad Wrought	13.50 to 14.00
Shafting, Iron and Soft Steel	17.00 to 17.50
No. 1 Dealers' Wrought	11.00 to 11.50
No. 1 Mill	7.50 to 8.00
No. 2 Mill	6.00 to 6.50
No. 1 Busheling	8.50 to 9.00
No. 2 Busheling	7.50 to 8.00
Iron Car Axle Turnings	10.00 to 10.50
Soft Steel Axle Turnings	8.50 to 9.00
Machine Shop Turnings	7.50 to 8.00
Wrought Drillings	6.00 to 6.50
Cast Borings	4.00 to 4.50
Mixed Borings and Turnings	5.00 to 5.50
No. 1 Boilers, cut	9.50 to 10.50
Boiler and Ship Scrap	8.00 to 8.50
No. 1 Cast	13.00 to 13.50
No. 2 Cast	9.50 to 10.00
Railroad Malleable Cast	13.00 to 13.50
Agricultural Malleable Cast	10.50 to 11.00

Metals.—The market is quiet, and quotations are unchanged. Carload lots of Lake are quoted at 17½c. and Casting brands at 17¼c. Desilverized Pig Lead is held at 4.32½c. and Corroding at 4.42½c. in 50-ton lots.

Coke.—Quite a little business is doing with furnace companies and smelting establishments. A brisk inquiry is being received for Foundry Coke for the first six months. No changes in freight from the Coke regions have been made, although shippers are working diligently to secure lower rates. Quotations on 72-hour Coke are continued at $4.50 to $5.

St. Louis.

Office of *The Iron Age*, 1205 Chemical Building,
St. Louis, December 31, 1900.

Pig Iron.—The close of the year did not witness any buying beyond ordinary wants. Probably 800 to 1000 tons of Foundry Iron were bought by local concerns. The outlook is promising, there being a number of encouraging inquiries now in the hands of furnace representatives. The largest is for 4000 tons, then ranging downward to lots of several hundred tons, and all for Southern Irons. Indications are still strong that melting is drawing heavily on stocks and that January will bring into the market a substantial run of orders. Prices are nominally unchanged, although it must be said that there is some talk about concessions being made. We quote, f.o.b. St. Louis:

Southern, No. 1 Foundry	$15.00 to $15.25
Southern, No. 2 Foundry	14.50 to 14.75
Southern, No. 3 Foundry	14.00 to 14.25
No. 1 Soft	15.00 to 15.25
No. 2 Soft	14.50 to 14.75
Gray Forge	13.50 to 13.75

Bars.—Jobbers report an unwonted volume of business for the month, the tonnage being disposed of in the regular way and made up of running wants. Mills have no new engagements to mention, but are actively engaged in filling past orders. Mill prices for both Iron and Steel in heavy tonnage are 1.45c. to 1.50c., half ex-

tras, East St. Louis. Jobbers' price on less than carloads is 1.75c. to 2c., full extras.

Rails and Track Supplies.—Inquiry is decidedly good for Track Supplies, of which Bolts are named at an advance over prices last quoted. There is not much doing either in Light Rails or those of Standard Section. It is understood that a California road will shortly be in the market for some 8000 tons Standard Section. We quote Splice Bars 1.50c. to 2c.; Bolts, with Square Nuts, 2.30c. to 2.40c.; with Hexagon Nuts, 2.40c. to 2.50c.; Spikes, 1.70c. to 1.80c.

Pig Lead.—Market is absolutely featureless at no change in prices. Common Lead is unchanged at 4.20c.; better brands, 4.22½c.; Chemical, 4.25c., and Desilverized, 4.32½c. Lead Ore remained at $46 per ton.

Spelter.—The dullness prevailing in this metal has not yet been lifted and 3.95c. is quotable price this week. Zinc Ore sold at $28 as top price, with tendency to lower value.

Pittsburgh.

Office of *The Iron Age*, Hamilton Building, Pittsburgh, January 2, 1901.

(By Telegraph.)

Pig Iron.—The market is exceedingly quiet, and very little has been done in the past week. It is possible the Ore interests will not fix prices of Ore for this year's delivery until February or March. It has been customary to fix prices heretofore in the first week in January. It is certain, however, that costs of Ore, Coke and also labor will be lower this year than last. Small lots of Bessemer Iron are being sold at $13.25 to $13.50, Pittsburgh, but there have been no large sales. Mill Iron is firm at about $13.25, Pittsburgh, and No. 2 Foundry, $14.25 to $14.50. A sale of 300 tons of Mill Iron is reported at $13.25, Pittsburgh.

Billets.—A fair amount of Steel is being sold at pool prices. There are no special features in the market. We quote Bessemer Billets, Pittsburgh, Wheeling and the Valleys, at $19.75, delivered. Billets smaller than 3⅞ inches are $1 extra. Carbons higher than 0.21 and up to 0.60 are $1 extra; 0.61 up to 1 are $2 extra. Basic Open Hearth Steel, $1 a ton extra over the price of Bessemer. For cutting small Billets, 50c. per ton extra.

Sheet Bars.—Commencing with Bars shipped in this month, some of the Sheet mills will pay an advance over present prices fixed by the pool. We quote Sheet and Tin Bars at $20.75, delivered, Pittsburgh, Wheeling and Valley districts. For Cutting Sheet and Tin Bars, 50c. per ton extra.

Structural Material.—We may note that the contract for the Marshall-Field Building, at Chicago, has been taken by a local concern, and the material, about 8000 tons, will likely go to the Carnegie Steel Company.

Coke.—Strictly Connellsville Furnace Coke is held at about $1.75, and Foundry at $2.25 a ton.

Muck Bar.—We quote Standard grades at $25, Pittsburgh.

(By Mail.)

The last week in the Iron trade in 1900 was extremely quiet, nothing of special interest taking place. Tonnage fell off very much in December, railroads reporting a very heavy decrease in shipments of all kinds of Iron and Steel. However, this is usual at this time of the year, and is not regarded as specially significant. Better demand for material is confidently expected after the first of the year, but in view of the fact that lower costs on Pig Iron are coming, it is probable buyers may go slow for the first two or three months. No intimations are given of any change in price of Billets by the Billet Association, but the report is current that Rails may be advanced about January 15. A reduction of 30c. a ton on Coke to Philadelphia and Baltimore went into effect on January 1. There has also been a cut in price of Steel Boiler Tubes. Other than the above, there have been no changes in prices worthy of note.

Ferromanganese.—We continue to quote 80 per cent. Ferro at $62.50 in carload lots, delivered, buyer's mill.

Structural Material.—There have been no specially large contracts placed during the week, but a good deal of work is being figured on. The Marshall-Field dry goods store in Chicago, about 7000 to 8000 tons, will likely be placed this week. Some Eastern work is also coming up, and additional foreign work has been placed. The announcement that the Federal Steel Company are going to put in large Beam mills in 1901 is regarded with interest by the trade. There has been no change in prices, and we quote: Beams and Channels, up to 15-inch., 1.50c.; over 15-inch, 1.60c.; Angles, 3 to 6 inches, inclusive, 1.40c.; over 6 inches, 1.50c.; under 3 inches, 1.25c.; Zees, 1.50c.; Tees, 1.55c.; Steel Bars, 1.25c. to 1.35c., half extras, at mill; Universal and Sheared Plates, 1.40c., all f.o.b. Pittsburgh.

Plates.—There is a good steady demand for Plates, but not so heavy as some time ago. However, the mills are loaded to the guards with tonnage, and deliveries inside of 60 to 90 days are difficult to obtain. A good deal of foreign work is being taken. It is not expected that there will be any change in prices on Plates for some little time at least. Prices as fixed by the Plate Association are as folows: Tank quality, ¼-inch and heavier, 1.40c.; 3-16 inch, 1.45c.; under 3-16 inch and above No. 10, 1.50c.; Flange or Boiler Steel, 0.1c. advance over base of Tank; Marine and Fire Box, American Boiler Manufacturers' Association specifications, 0.2c. advance over Tank; Still Bottom Steel, 0.3c. advance over Tank; Locomotive Fire Box Steel and equivalent specifications, 0.5c. advance over Tank, all f.o.b. Pittsburgh.

Bars.—We note a continued active demand for Bars, and mills are pushed to utmost capacity to get out deliveries as fast as wanted. It is reported that some sellers are holding Steel Bars at 1.35c. minimum. However, some of the large mills are still quoting 1.25c. on good orders for extended delivery. We quote Steel Bars at 1.25c. to 1.35c., half extras, at mill. There is a good demand for Iron Bars, and the leading mills are filled up for the next two or three months. We quote Iron Bars at 1.30c., at mill, in carload lots. Special grades of Iron Bars are quoted at 1.50c. to 1.75c., at mill.

Steel Rails.—We continue to quote standard sections at $26, at mill. Several large foreign contracts have recently been placed, and more work of this kind is being figured on. It is expected that several leading roads will come into the market after the first of the year. We can state that the price of Rails may be advanced about January 15 to $28.

Sheets.—A heavy tonnage in both Black and Galvanized Sheets is being placed, buyers contracting for deliveries a considerable time ahead. With the crowded condition of the mills indications are that prices of Sheets will not be any lower for the first quarter, at least. We quote No. 27 Black Sheets, box annealed, at 2.85c.; No. 28, 2.90c. in carload lots. For small lots higher prices are asked. We quote Galvanized Sheets at 70, 10 and 5 per cent. in carload lots, f.o.b. mill.

Skelp.—There is a good demand for Iron Skelp, but Steel is dull and has been for some time. We quote Grooved Iron Skelp at 1.50c. to 1.55c. and Sheared at 1.55c. to 1.60c. We quote Grooved Steel Skelp at 1.35c. and Sheared at 1.40c., f.o.b. Pittsburgh; terms four months or 2 per cent. off for cash in 30 days.

Merchant Steel.—Considering the season of the year, demand is satisfactory. A material increase in orders is looked for after January 1. Specifications on contracts are coming in very freely. We quote: Plow Slabs, ¼-inch and heavier, at 1.60c., base; Tire Steel, 1.35c. to 1.40c.; Toe Calk, 1.70c. to 1.75c.; Open Hearth Machinery, 2c., base; Open Hearth Spring, 2c., base; Hammered Lay Steel, 3c. to 3.25c.; Rolled Lay Steel, 2.75c. to 3c.; Cold Rolled Shafting, 57 per cent. off in carload lots; 52 per cent. in less than carload lots, delivered in base territory. Tool Steel, 7c. and upward, according to quality. On Tool Steel freight is allowed east of the Mississippi River. Terms are 30 days net, except Tool Steel, on which 60 days are allowed, less 2 per cent. off for cash in 10 days.

Tubular Goods.—We note a seasonable demand for Tubular Goods, better than usual at this season of the year. The continued unevenness in Steel Boiler Tubes,

to which we have before referred, has resulted in prices being reduced, which are given below. Prices to consumers in carload lots are as follows:

Merchant Pipe.

	Black. Per cent.	Galvd. Per cent.
⅛ to ½ inch and 11 to 12 inch	61	48
¾ to 10 inch	68½	56

Casing, Random Lengths.

	S. & S.	I. J.
2 to 3 inch	58	53½
3½ to 4 inch	63	59
4½ to 12½ inch	65	61½

Casing, Cut Lengths.

	S. & S.	I. J.
2 to 3 inch	53½	49
3½ to 4 inch	59	55
4½ to 12½ inch	61½	57½

Boiler Tubes.

	Up to 22 feet. Per cent.
Steel.	
1 inch to 1¾ inch and 2¾ inch to 5 inch, inclusive	68½
2 inch to 2½ inch, inclusive	63
6 inch and larger	62
Iron.	
1 inch to 1½ inch and 2½ inch	49½
1¾ inch to 2¼ inch	45
2¾ inch to 13 inch	57

Coke.—The Furnace Coke trade continues dull, but reports of standard brands of Coke being offered at $1.50 or less are utterly untrue. Strictly Connellsville Furnace Coke is being held by the leading Coke interests at $1.75 a ton; 72-hour Foundry at $2.25 a ton. It is true that some brands of Coke made outside the Connellsville region, and inferior in quality, are being offered at lower prices. Last week there were 15,967 ovens in the Connellsville region active and 4987 idle, the output having been 179,125 tons, an increase in output over the previous week of 16,439 tons. This is the biggest gain made in production in the Connellsville region for some time and would indicate a better demand for Coke.

Iron and Steel Scrap.—The market is exceedingly quiet, and we are not advised of any recent sales. A better business in Scrap is expected after the first of the year. Only nominal prices can be given, which are as follows: No. 1 Railroad Wrought Scrap at $14 to $14.50 net ton; Old Iron Rails, $19.50 to $20 gross ton; Old Steel Rails, $15 to $15.50; No. 1 Tank and Pipe Scrap, cut, $10.50 to $11 net ton; Turnings, $6.50 to $7; Cast Iron Borings, $5 to $5.50; Low Phosphorus Melting Stock, $14.50 to $15; Soft Busheling Scrap, $10.50 to $11; Old Horseshoes, $12 net ton.

Cincinnati. (*By Telegraph.*)

Office of *The Iron Age*, Fifth and Main streets, Cincinnati, January 2, 1900.

Nineteen hundred has closed on a Pig Iron market that can be classified as extremely quiet, without a suspicion of dullness and remarkably steady without any feeling of inflation. It is an old saying that it is either a feast or a famine in Pig Iron, and that prices are generally on the ladder or the toboggan slide. But now, to the satisfaction of both buyers and sellers, prices are holding steady. There is a variation of about 50c. between high and low. A little Iron may, perhaps, be had at 25c. under the minimum figure given herewith, but out of the ordinary conditions of some sort go with such quotations, and it would hardly be fair to what may be termed "straight" business to recognize any lower basis than our minimum quotations as standard. The one possible exception to this statement is Gray Forge and kindred grades of Iron. There has been so very little demand or even inquiry for such stock throughout the past months as to make it uncertain as to how it would act in case buyers should turn their attention to it. Some furnaces think it should sell on the basis of $10.25, Birmingham, but again others say as low as $9.75, and there are a few agents who think that even this figure might be shaded a little on orders where all the conditions were thoroughly approved. From the present indications it will not be long until these opinions will be tested, as there are now quite a few inquiries in for Mill and No. 4 Irons. Some of these are for round lots. Trading throughout the past week has been seasonable, and if any different from the ordinary holiday business, it is that the volume is slightly larger than what might be looked for in a pleasure producing season. All quotations are unchanged. Freight rate from Birmingham is $2.75 to this point; from Hanging Rock district, $1. We quote, f.o.b. Cincinnati:

Southern Coke, No. 1	$14.25 to $14.50
Southern Coke, No. 2	13.75 to 14.00
Southern Coke, No. 3	12.75 to 13.00
Southern Coke, No. 4	12.50 to 12.75
Southern Coke, No. 1 Soft	14.25 to 14.50
Southern Coke, No. 2 Soft	13.75 to 14.00
Southern Coke, Gray Forge	12.50 to 12.75
Southern Coke, Mottled	12.50 to 12.75
Ohio Silvery, No. 1	17.00 to 17.50
Ohio Silvery, No. 2	16.00 to 16.50
Lake Superior Coke, No. 1	15.50 to 16.00
Lake Superior Coke, No. 2	14.50 to 15.00
Lake Superior Coke, No. 3	13.50 to 14.00
Southern Basic	.... to 14.25

Car Wheel and Malleable Irons.

Standard Southern Car Wheel, chilling grades	$18.75 to $19.75
Standard Southern Car Wheel, No. 2	17.75 to 18.75
Lake Superior Car Wheel and Malleable	19.00 to 20.00

Plates and Bars.—Business is a little quiet, though the market is considered steady and normal. We quote, f.o.b. Cincinnati: Iron Bars, in carload lots, 1.45c., with half extras; in small lots, 1.75c., with full extras; Steel Bars, in carload lots, 1.40c., with half Steel card extras; Base Angles, in carload lots, 1.50c. to 1.55c.; Plates, 1.55c. for ¼-inch and heavier; Sheets, No. 10, 1.95c.

Old Material.—While quotations are unchanged, yet there is more pressure to sell noticeable, and some fancy a slight weakness. Dealers' buying prices per gross ton are, f.o.b. Cincinnati: No. 1 Wrought Railroad Scrap, $15.25; Cast Railroad and Machinery Scrap, $11; Old Iron Axles, $17; Iron Rails, $18; Steel Rails, rolling mill lengths, $13; short lengths, $12; Car Wheels, $15.

Cleveland.

Cleveland, Ohio, December 31, 1901.

Iron Ore.—The reports of the dock managers to the shippers in this city, made during the week just closed, shows that the receipts of Iron Ore at the south shore ports during the season of navigation amounted to 15,797,787 tons, which, subtracted from the total shipment from the head of the lakes, 18,701,000 tons, indicates the amount of that product which went to the docks at South Chicago. The reports show that the movement to Lake Erie this last season amounted to 575,000 tons more than during the season of 1899, which showing is considered most satisfactory in the light of the slight increase in the general movement and in view of the fact that the consumption at the furnaces fell short of expectations. While the movement to the south shore ports shows an increase, the shipment to the furnaces was light. This movement for this season, between May 1 and December 1, amounted to 11,613,773 tons, a decrease of something over 500,000 tons, which is attributed to the slump in the Iron market between July 1 and the election in November. The increased consumption of Pig Iron now has greatly increased the demand for Ores, hence the railroads have been busy of late moving Ore to the furnaces.

Pig Iron.—This has been a very quiet week in Pig Iron affairs. Most of the orders now being placed are applications on contracts formerly closed, although some are buying for future delivery. The sales for spot delivery have been very light this week. The stock piles are getting low, and it is expected that brisk business will develop within two weeks. There has been no change in the prices demanded and received for Foundry Irons. No. 1 is still being sold at $14 and No. 2 at $13.50. Basic is quoted at $13.50 and off-Basic at $12.50, but in both of these the sales have been even lighter than in the Foundry Irons. A rumor has been going the rounds this week that the Bessemer Association are to meet at an early date to decide upon the price of Pig Iron and also to discuss the prospects of opening their furnaces. As far as learned this is only a report, although the furnacemen are talking quite a little of opening up their plants, seeing the prospective demand for the product.

Finished Material.—The only business being done is in Rails for electric lines and Plates for bridge work and other structural purposes. The sales of Plates and all Structural Shapes have been so heavy that warnings to the trade are being issued to get under cover before the capacity of the plants has been exhausted. The building

boom promised for this year exceeds, in prospect, any that this section has seen for years, and the Shapes and Plates are now and will be in very good demand. In the light of this prospect the mills are not seeking business very far ahead, and it looks as if they expected another advance, and a sharp one, in a short while. The mills are not coveting orders for any length of time ahead, desiring to keep the material out of the hands of jobbers and speculators who wish to trade on the market prospects. It looks more now than it has before as if the 1.40c., Pittsburgh, price recently agreed upon was a compromise and only a temporary measure, as some of the larger mills are already insisting that the figures be marked up slightly. The capacity of the Plate mills is not only threatened from the builders' corner of the market, but also from the ship yards, large orders for Steel steamers constantly being heard of. The orders for Steel Rails have been heavy, especially those Rails that are used for the construction of suburban lines. Some of the orders are also for steam roads, but for the most part this trade has covered its needs and has now retired until at least the time when the new spring work will be entered upon. The sales of Bars have been moderate of late, the rush seeming to have subsided for the present. Nothing is being done in Billets, although a nominal quotation is still made of $19.75.

Old Material.—The market is in a peculiarly unsettled state. The buyers have covered their needs for some time to come and are not in the open market making any large demands for new material. The prospects, based upon other business conditions, are for a better business later on, but just now it is nothing at all encouraging. In fact the general depression in the market seems to be more marked in the Scrap trade than any other. The quotations made this week are merely nominal, and the suggestion is that they may be shaded when there is better demand. No. 1 Wrought, $16; No. 1 Busheling, $13; Heavy Steel, $14; Turnings, $9; Borings, $6.50; Machinery Cast, $13.

Philadelphia Iron Market.

(By Telegraph.)

There has been no business of any account during the past few days, but a great many applications have been sent in and it seems as though buyers were disposed to take large lots providing that nothing unfavorable occurs to suggest delay. Pig Iron is in some cases a few cents lower, but the general market is strong at last week's prices. It is a little early to define the situation very closely, but as a rule the feeling is hopeful and confident, but whether it will lead to immediate purchases or not remains to be seen.

New York.

Office of *The Iron Age*, 282-288 William street, New York, January 2, 1901.

Pig Iron.—Buying has continued on a fair scale, being rather better than is usual at this season of the year. Producers are firm in their prices for the first quarter, but there is a disposition to seek some business for later delivery. Quotations are as follows at tidewater: Lehigh, Schuylkill and Virginia Irons, No. 1, $17 to $18; No. 2 X, $15.50 to $16; No. 2 Plain, $14.25 to $15; Gray Forge, $14.25 to $15. Tennessee and Alabama brands, No. 1 Foundry, $15.50 to $16; No. 2 Foundry, $14.50 to $14.75; No. 1 Soft, $15.50 to $15.75; No. 2 Soft, $14.50 to $14.75; No. 3 Foundry, $14 to $14.25; No. 4 Foundry, $13.50 to $13.75; Gray Forge, $13.50 to $13.75.

Cast Iron Pipe.—Some smaller orders recently pending have been closed, but it is understood that the bids for upward of 5000 tons for Boston have been rejected. Owing to the open winter thus far, Pipe laying has proceeded steadily, and the demand for small lots in December was better than usual. There is every indication that the tonnage of large Pipe this year will be rather heavy. We quote 8-inch Pipe at $24.50 to $25.50 per gross ton, tidewater.

Steel Rails.—Some large sales for the home market have been made, apparently in anticipation of the rumored advance in prices, which may be decreed at an early date and may amount to $1 or to $2 per ton. We quote $26 for Standard Sections, $25 and $26 for Light Sections, and $38 to $38.50 for Girder Rails. We quote Spikes, 1.50c. to 1.60c.; Splice Bars, 1.35c. to 1.40c.; Square Track Bolts, 2.10c. to 2.15c., and Hexagon Bolts, 2.25c. to 2.30c.

Finished Iron and Steel.—Among the orders for Structural Material taken by the American Bridge Company are 4000 tons for the new Astor Hotel, at Fifty-fifth street and Fifth avenue, and 1500 tons for a department store in Newark, N. J. We quote as follows at tidewater: Beams, Channels and Zees, 1.65c to 1.70c.; Angles, 1.30c. to 1.40c.; Tees, 1.65c. to 1.75c.; Bulb Angles and Deck Beams, 1.90c. to 2c.; Universal Mill Plates, 1.58c. to 1.60c.; Sheared Steel Plates are 1.58c. to 1.60c. for Tank, 1.68c. to 1.70c. for Flange, 1.78c. to 1.90c. for Fire Box. Charcoal Iron Plates are held at 2.25c. for C. H. No. 1, 2.75c. for Flange and 3.25c. for Fire Box. Refined Bars are 1.40c. to 1.45c.; Common Bars, 1.30c. to 1.35c.; Soft Steel Bars, 1.35c. to 1.40c., and Hoops, 1.90c. to 2c., base, on dock.

Belgian Iron Market.

Brussels, December 15, 1900.—The situation has grown considerably worse in Belgium since my last letter to *The Iron Age*. The position is very bad, particularly so far as Finished Products are concerned. English, German and American competition is very severe in the international markets. The Americans particularly are fighting us in the extreme Orient and in Eastern Europe. It is there, too, that we meet the products of the Austrian and Hungarian works. The result is that our exports are falling off from month to month. Some weeks since there was a revival of hope among our rolling mills; suddenly a number of large orders for the Transvaal were received, and later on also for British India, the latter country buying even more than it had last year at the same time. Besides, buyers insisted strongly upon quick delivery. But this movement has slackened, and it is now believed that it was a question merely of orders successively received by the merchants and brokers of London, Hamburg, Antwerp and Brussels which they had for a long time kept back in order to allow the market to sag further so as to obtain larger profits. As soon as they had covered in this way the export market fell into a dull condition.

Attention should also be called to the fact that the competitors from Germany and from France have met the Belgian producers in our own country, right into the Liège and Charleroi districts. France particularly sends us fine Sheets, but Germany attacks all Finished Iron and Steel in general, and more particularly Rolled Steel. The result is that Finished Iron maintains its own relatively better than Steel. The large German Steel works are almost the only ones to export to Belgium, the small rolling mills on the other side of the Rhine taking little part in this movement. The Belgian consumers express themselves as little satisfied with the finish and character of the materials which they receive from Germany. The result is that, in spite of differences in price, Belgian consumers are often forced to order from the small Belgian rolling mills, which furnish a better class of material; therefore it is the large Belgian Steel works which suffer most from this German competition. Although the latter has been felt a little less during the last six weeks it is still very hurtful and has forced the Belgians to drop their selling prices for Finished Products below actual cost. This will be shown later on.

For Pig Iron, however, there is still a sufficient margin of profit. This, however, is due to the circumstance that all the blast furnaces have their Coke supplied to them at 22 francs per ton until the end of this year. The syndicate intends to demand 30 francs from January 1 and for the whole of the year 1901. Naturally the blast furnaces energetically refuse to negotiate on the ground that Pig Iron is declining more and more in Belgium and that Germany has begun exporting Pig to Belgium; that, furthermore, in Germany the Coke Syndicate has arranged for the supply for 1901 on the basis of 17 marks, or 21.25 francs. Under these circumstances the Belgian blast furnacemen urge with justice that the price of 1900,

which was 22 francs, ought to rule also in 1901. Until now not a single contract has been renewed, although a short time only remains before the expiration of existing contracts.

The collieries have found it necessary to make their first concessions of 2 francs per ton on Coal to the metallurgical works. The Belgian Glass industry is almost completely idle as the result of a strike which began on August 1. Since the rolling mills are only running about two days in the week it will be readily understood that considerable stocks of Coal have accumulated. Then, besides, it must be remembered that since the metallurgical consumption in Germany has fallen off, in spite of the fact that prices are very much lower there than with us in Belgium, the Germans have succeeded without lowering their prices in offering a good deal of Coal at competitive figures in spite of the high cost of transportation. At this moment they are offering run of mine with 40 per cent. of nut at 16.50 francs for 1900, and at 14 francs for 1901 deliveries. A metallurgical plant near Antwerp has closed at the latter price, to which 3 francs must be added for transportation.

As the result of a decline of 2 francs run of mine Coal in the Flenu Basin has come down to 23 francs at the mine, which makes the corresponding price for Screenings 20.50 francs. The collieries have tried hard, in consideration of this concession of prices, to get the rolling mills to cover for three months up to February 1, but the mills have refused to enter into such a bargain, and they are taking their supplies from day to day only, urging that this reduction of 2 francs is far from being heavy enough to allow them to run without losing money. They believe, and the condition of the markets justifies their belief, that at an early date further lowering prices on the part of the collieries must come. Your correspondent believes that a decline of 3 francs per ton is imminent, so as to bring run of mine down to 20 francs, or even 18 francs.

A recent letting by the Belgian State Railroads for the whole of the year 1901 has brought out the price of 7.30 francs for Old Material. The open market is close to 7 francs, and is pretty firm. There is very little hope of a lowering of prices in this direction, Old Material never having fallen with us below 6 francs as a minimum, so that there is only a small margin left.

Wages have declined 5 to 10 per cent., according to the districts. The men realize perfectly the painful position of the metallurgical industries, and have not even thought of protesting. Besides, labor is abundant at this time. It even seems probable that a further lowering of wages will take place at an early date.

I shall now give three examples bearing on the cost of manufacturing Pig Iron in Belgium, on the cost of Muck Bar and of Finished Iron, contrasting these figures with selling prices:

Cost of Pig Iron.	Francs.
Ore, 3000 kg. at 8 francs per ton	24.00
Coke, 1200 kg. at 22 francs per ton	26.40
Labor and miscellaneous	8.50
Total cost of production	58.90

In round numbers, we may say 59 francs as the cost. Mill Iron is selling at 70 francs for prompt delivery. It is probable, however, that for longer delivery prices will soon drop to 65 or even 60 francs, so that if the blast furnaces were forced to agree to the price of 30 francs per ton for Coke, the cost would be carried up to 68.50 francs and the furnaces would lose money.

Putting Coal down at 23 francs, which is considerably less than the average figure, and putting Mill Iron at 71 francs, which is the actual average, we have the following:

Cost of Muck Bar.	Francs.
Pig Iron, 1160 kg. at 71 francs per ton	82.36
Coal, 1000 kg. at 23 francs per ton	23.00
Labor and miscellaneous	12.40
Total cost of Muck Bar	117.76

At the forge Muck Bar is selling at 117.50 francs, so that there is a loss of 25 centimes per ton.

Cost of Finished Iron Per Ton.	Francs.
Muck Bar, 1120 kg. at 117.50 francs per ton	131.88
Coal, 650 kg. at 23 francs per ton	14.95
Labor and miscellaneous	11.80
Total cost of Finished Iron	158.63

No. 2 Iron Bars are selling to-day at 150 francs, and often, particularly for export orders, the price has recently gone down, f.o.b. Antwerp, to 147 and even 145 francs. My attention is called to the report that a works in the Charleroi district has recently sold at 135 francs, Antwerp. I refuse to believe it, however, although the plant has its own collieries, ore mines, blast furnaces, steel works and rolling mills, and is therefore in a special position. Whatever may be true as to the price named, it is certain that even when selling at 150 francs the Belgian rolling mills would now lose about 8 francs per ton. It must, however, be considered that the mills have orders on their books for material sold at prices for delivery at the present time which are considerably higher than those now ruling, so that they are still earning good profits. These old orders, however, are being exhausted, and buyers, particularly in England, cancel, without any pretext whatever, formal and regular contracts when they do not suit them any longer.

It should be noted that the home consumption in Belgium has fallen off considerably. The construction shops, Bolt works and Nail mills have a good deal less of work on hand than they had some months since, and the Germans as well as the French fight for every order which presents itself. In any case, business is now so poor that a number of blast furnaces and rolling mills have stopped for longer or shorter periods, and that all of them are idle two or three days per week, without counting those who have dropped night shifts entirely.

The uneasiness which has appeared at Charleroi is now most pronounced at Liége, because of its greater vicinity to Germany.

Our exports are diminishing again, while, on the other hand, the imports are considerably increasing, at least so far as finished products are concerned.

Metal Market.

Office of *The Iron Age*, 232-238 William street, New York, January 2, 1901.

Business has not quite awakened after its long suspension owing to the holiday period. Like that of a week ago, business was at a very low ebb owing to the interruption of the holiday. Quotations having been received from the London 'Change to-day, however, there was enough feeling about to show that, with the exception of Tin, prices are nominally unchanged.

Pig Tin.—The market closed dull to-day at lower prices than those prevailing a week ago. Spot to February was quoted to-day at 26¾c. to 27¼c. There is no longer a premium on spot, as stocks are now more plentiful. The London market closed to-day at £121 10s. for spot and £121 5s. for futures. According to the figures posted by the New York Metal Exchange the arrivals during the month of December amounted to 3311 tons. Deliveries into consumption were 2400 tons, and stocks, including landing, amounted to 3041 tons. Afloats are 1350 tons, thus bringing the total to 4691 tons. The total statistics show as follows: Arrivals during the year, 27,747 tons; delivery into consumption during the year, 28,700 tons. These figures show a falling off of 1400 tons as compared with the returns of the year of 1899. The total visible supply at the end of the year was 16,115 tons, a decrease of about 1428 tons as compared with the year previous. It may be of interest to look back on the result of the year's manipulation. The following table shows the fluctuations in prices for the year of 1900:

	New York.		London.	
	Highest. Cents.	Lowest. Cents.	Highest.	Lowest.
January	28.25	24.67½	£130	£108 10s.
February	32.50	27.30	147 10s.	125
March	35.00	30.75	153 5s.	132
April	32.00	29.25	140	135 2s.
May	30.00	28.42½	137 10s.	131
June	31.75	29.25	147	133 15s.
July	35.00	30.62½	145 10s.	138 5s.
August	32.50	30.00	145 5s.	134 5s.
September	30.77½	29.87½	136 15s.	125
October	29.75	29.60	136	125 10s.
November	28.90	29.12½	129 2s.	125 10s.
December	28.00	25.00	125	112

Copper.—There has been scarcely any business whatever during the week under review. The market is un-

QUOTATIONS OF IRON STOCKS DURING THE WEEK ENDING JANUARY 2, 1901.

Cap'l Issued.		Thursday.	Friday.	Saturday.	Monday.	Tuesday.	Wednesday.	Sales.
$29,000,000	Am. Car & Foundry, Common	22⅛-22½	22 -22½	22¼-22½	22¼-22½	.....	22¼-23¼	14,600
29,000,000	Am. Car & F'ndry, Pref. (7 % Non-Cu.)	70¾-71¼	70¾-71⅜	71 -71⅜	71¾-72	.....	71¾-72¼	7,500
19,000,000	Am. Steel Hoop, Common	31¾-32½	31¾-32⅞	-32	31½-32½	.....	32 -33¾	17,900
14,000,000	Am. Steel Hoop, Pref. (7 % Cu.)	77½-78	77½-78	.....	-78	.....	-78	5,100
50,000,000	Am. S. & W., Common	44½-45	44½-47½	45¼-46¼	45⅛-46¾	.....	46 -47½	142,600
40,000,000	Am. S. & W., Pref. (7 % Cu.)	87¼-87¾	87½-89	87⅞-88	88 -88½	.....	88 -88½	6,200
28,000,000	Am. Tin Plate, Common, N. Y.	56⅜-57⅛	55⅛-56⅞	55½-56	56 -56¾	.....	55¾-57¼	41,900
18,325,000	Am. Tin Plate, Pref., N. Y. (7 % Cu.)	90½-92	-91¾	.....	91¾-92	.....	-90½	1,700
7,500,000	Bethlehem Iron†	.....	.....	.....	-59	.....	.....	4
15,000,000	Bethlehem Steel, par $50, $1 paid in	17⅞-18⅛	18½-18⅝	18¾-19	.....	.....	-20	6,620
7,974,550	Cambria Iron, Philadelphia*	.....	-45	.....	45 -45½	.....	.....	110
16,000,000	Cambria Steel**	20⅛-20¾	20½-21	20⅝-20¾	20¾-20⅞	.....	20¾-21¼	11,542
11,000,000	Colorado Fuel & Iron	55 -56½	55 -56¼	54¾-55⅝	54⅜-55¾	.....	54¾-56½	23,700
46,484,300	Federal Steel, Common	56¾-58	56½-58¼	56¼-57⅝	56¾-57¾	.....	57¼-59	103,400
53,253,500	Federal Steel, Pref. (6 % Non-Cu.)	77½-77⅞	77⅛-78	77¼-77⅝	77½-78	.....	77½-79	10,000
32,000,000	National Steel, Common, N. Y.	41½-42½	41¾-43	41 -42	41⅝-42½	.....	42½-44⅜	49,200
27,000,000	National Steel, Pref., N. Y. (7 % Cu.)	91½-92	91½-91¾	-91½	.....	.....	92½-93½	1,800
40,000,000	National Tube, Common, N. Y.	64½-66	66 -67⅞	67 -69	69 -69⅞	.....	68 -70	41,500
40,000,000	National Tube, Pref., N. Y. (7 % Cu.)	104-105½	105-105¼	105-105¼	105¼-105½	.....	105½-106	3,600
5,000,000	Penna., Common, Philadelphia	.....	77½-78	-75	73 -76	.....	.....	395
1,500,000	Penna., Pref., Philadelphia	.....	-100	-100	.....	.....	.....	49
12,500,000	Pressed Steel, Common	51¼-52	50½-51½	49½-50½	50½-51	.....	51 -51⅞	4,400
12,500,000	Pressed Steel, Pref., (7 % Non-Cu.)	82 -83	82¼-82½	-83	83 -83½	.....	83 -83½	2,000
27,191,000	Republic Iron & Steel, Common	16¼-16½	16½-16⅞	16¾-16⅞	16½-17	.....	16⅝-18½	8,800
20,306,900	Repub. Iron & Steel, Pref. (7 % Cu.)	63¾-64⅝	64 -64½	-64	64⅛-64¾	.....	64⅛-65½	5,600
7,500,000	Sloss-Sheffield S. & I., Common	-23	.....	.....	-23	.....	25 -25¼	700
6,700,000	Sloss-Sheffield S. & I., Pref. (7 % Non-Cu.)	-69	68 -69¼	.....	.....	.....	.....	700
20,000,000	Tennessee Coal & Iron	65¼-67½	63½-67	63¼-65	64¼-65½	.....	63⅞-66¾	32,100
1,500,000	Warwick Iron & Steel (par $10)	.....	.....	- 8	.....	.....	.....	50
15,000,000	International Pump, Common	-29	.....	.....	-29	.....	.....	1,100
12,500,000	International Pump, Preferred	.....	-76	.....	77 -77¼	.....	-77	900
11,000,000	International Silver	5¼- 6	6¼- 7¾	7 - 7¾	7¼- 8	.....	- 7½	4,200

* Par $50. ** $10.50 per share paid in. † 6% guaranteed by Beth. Steel Co. Late Philadelphia sales by telegraph. ‡ Ex-dividend.

Bonded indebtedness: Am. S. & W., $130,656; Am. Tin.Plate, none; Am. Steel Hoop, none; Cambria Iron Co., $2,000,000 6 % debenture 20-year bonds, 1917, payable option 5 years, assumed by Cambria Steel Co.; Federal Steel Co., $9,822,000 Illinois 5 %, $7,417,000 E. J. E. R. R. 5 %, $1,600,000 Johnson 6 %, $6,732,000 D & I R. R. R. 5 %, $1,000,000 2d D. & I. R. R. R. 6 %, $10,000 land grant D. & I. R. R. R. 5 %; National Steel, $2,561,000 6 %; National Tube, none; Tennessee C., I. & R. R. Co., $8,367,000 6 %, $1,114,000 7 %, $1,000,000 7 % cu. pref.; Pennsylvania Steel, $1,000,000 5 %, Steelton, 1st, 1917. $2,000,000 5 %; Sparrow's Point, 1st, 1922, $4,000,000, consolidated, both plants; Bethlehem Iron, $1,351,000 5 % maturing 1907. Interest and principal guaranteed by Bethlehem Steel Co. Republic Iron & Steel, none; Warwick Iron & Steel, none; Colorado Fuel & Iron Co.; Col. Fuel Co. Gen. Mort. 6 % $880,000, Col. Coal & Iron Con. Mort. 6 % $2,810,000, Col. Fuel & Iron Gen. Mort. 5 % $2,303,000. Also outstanding $2,000,000 preferred stock on which dividends have been paid to June 30, 1900. Sloss-Sheffield St. & I. Co., Sloss I. & S. first mortgage 6 %, $2,000,000, Sloss I. & S. general mortgage 4½ % $1,835,000.

changed and very quiet. Lake is still nominally 17c. and Electrolytic is quoted 16⅝c., with Casting at the same price. The London market closed to-day at £72 17s. 6. for spot and £73 12s. 6d. for three months' futures. Best Selected was quoted £79 10s. The exports to Europe only for the month of December amounted to 10,771 tons, and the figures for the year show 151,988 tons, as against 112,637 tons for the year of 1899.

Pig Lead—Is absolutely without change, business going on in a quiet way, with the volume very small. Prices quoted by the American Smelting & Refining Company are unchanged at 4.37½c. for lots of 50 tons and more, New York, and 4.32½c. for Desilverized, f.o.b. St. Louis. The London market was quoted to-day £16 5s. The arrivals during the month were 7700 tons and the exports amounted to 7011 tons.

Spelter.—The market is dull and easy. Demand has been exceedingly light. Spot is quoted here at 4.15c. and St. Louis is said to be easy at 3.95c. London closed at £18 15s.

Antimony.—There is no change, Hallett's being quoted 9¼c. and Cookson's 10½c.

Nickel—Is without change, and prices are nominally 55c. to 60c. for small lots. Large lots cannot be obtained.

Quicksilver—Is unchanged. Prices quoted here are $51 per flask of 76½ pounds in lots of 50 flasks and more. The London market is unchanged at £9 2s. 6d.

Tin Plate.—No change is reported and prices are steady. The American Tin Plate Company are still quoting on a basis of $4.19 per box of Standard 100-pound Cokes, f.o.b. New York, and $4 f.o.b. mill. These are the prices which the company named for the first quarter of this year.

Iron and Industrial Stocks.

Considering the shortness of the week the volume of business in industrial stocks has been quite heavy and the market has been well sustained. In fact, prices are generally speaking on a somewhat higher level. The largest advance has taken place in National Tube. The American Bridge, also a stock brought out by J. P. Morgan & Co., has attracted attention. Cambria Steel has shown some large transactions. As yet no official statement concerning the Pennsylvania Steel financing has been issued. Trading in the stock has been very light, no transactions being reported from Philadelphia to-day.

The directors of the Federal Steel Company are to meet on the 16th, to act on the dividend on the common.

	Bid.	Asked.
American Bridge Company, common	45¾	46⅛
American Bridge Company, preferred	95¾	96
American Bicycle Company, common	6½	7
American Bicycle Company, preferred	26	27
American Bicycle Company, bonds	..	75
American Sheet Steel, preferred	78¼	79
E. W. Bliss, common	..	137½
E. W. Bliss, preferred	125	..
Cramp's Shipyard stock	81	83
Diamond State Steel	3½	4
Empire Iron & Steel, common	4	10
Empire Iron & Steel, preferred	38	46
National Enamel. & St., common	18	20
National Enam. & St., preferred	80	84
New Haven	5⅛	5¼
Otis Elevator, common	29	30
Otiss Elevator, preferred	91	92
Pratt & Whitney, common	3½	5
Pratt & Waitney, preferred	45	55
Tidewater Steel	7¾	8
U. S. Cast Iron Pipe Company, common	5	5¼
U. S. Cast Iron Pipe Company, preferred	30	32
U. S. Projectile	100	..
H. R Worthington, preferred	110	115
Crucible Steel Company, common	22	..
Crucible Steel Company, preferred	79½	..

The following table shows the fluctuations during 1900 of the leading Iron stocks, the date of the highest and of the lowest prices reached, the closing quotation and approximately the total sales during the year:

Fluctuations in Stocks in 1900.

Sales.	Stock.	Highest.	Date.	Lowest.	Date.	Closing.
508.000	Am. Car & F. Com.	25⅛	Nov. 12.	12½	Jan. 15.	22½
218,000	Am. Car & F. Pre.	72	Dec. 30.	57⅜	June 25.	71¾
596,000	Am. St. Hoop Com.	50½	Feb. 6.	17	June 25.	32
111.000	Am. St. Hoop Pre.	86	Feb. 6.	64¼	Sept. 28.	78
4,172,000	Am. S. & W. Com	50⅞	April 2.	28⅛	June 25.	46
588,000	Am. S. & W. Pre.	95	Feb. 1.	69⅛	June 25.	88½
600,000	Am. T. Pl. Com.	57⅛	Dec. 27.	18	June 20.	56½
75.000	Am. T. Pl. Pre.	92	Dec. 27.	70¾	June 25.	92
675,000	Col. Fuel & I. Com.	56⅛	Dec. 27.	29¼	Sept. 24.	55
6,100	Col. Fuel & I. Pre.	131½	Jan. 17.	117	Oct. 19.	121½
3.230.000	Fed. St. Com.	58¼	Dec. 28.	28½	June 25.	57
414.000	Fed. St. Pre.	79½	Dec. 22.	60¾	June 26.	77½
790,000	Nat. St. Com.	53⅛	Feb. 6.	20	June 25.	43¼
95 000	Nat. St. Pre.	97	Feb. 6.	79¾	June 26.	92½
495,000	Nat. Tube Com.	69⅞	Dec. 31.	40⅞	June 25.	69½
147.000	Nat. Tube Pre.	105½	Dec. 31.	86¾	May 14.	105¼
218 000	Press. St. Car Com.	58¾	Jan. 17.	32½	Sept. 26.	51
56,000	Press. St. Car Pre.	89½	Nov. 10.	70¾	Sept. 26.	83
439,000	Rep. I. & S. Com.	27½	Feb 6.	8¾	June 25.	16¾
162,000	Rep. I & S. Pre.	70¾	Feb. 6.	49	Aug. 1.	64½
7,000	Sloss S. Com.	25	Nov. 21.	17½	Oct. 20.	23
18,000	Slosss S. Pre.	71	Nov. 20.	59¼	June 25.	69¼
1,700,000	Tenn. C. & I.	104	Feb. 2.	49	Oct. 3.	64¼

Tennessee Coal, Iron & Railroad Company.—The following is the statement of the company for November and for the 11 months of the current year:

November—	1900.	1899.	Increase.
Net earnings	$130,738	$285,610	*$154,872
Fixed charges	54,777	46,563	8,214
Surplus	$75,961	$239,047	*$163,086
From January 1 to November 30—			
Net earnings	$2,353,314	$1,561,004	$792,310
Fixed charges	602,546	512,193	90,353
Surplus	$1,750,768	$1,048,811	$701,957

* Decrease.

Dividends.—The Diamond State Steel Company have declared a dividend of 4 per cent., payable January 22. Books close January 12.

The Rhode Island Perkins Horse Shoe Company have declared a quarterly dividend of 1 per cent. on their preferred stock, payable January 15 to stock of record January 2.

The Cleveland Machinery Market.

Office of *The Iron Age*, The Cuyahoga, CLEVELAND, OHIO, December 31, 1900.

The S. M. York Machinery Company, recently incorporated, have purchased the entire stock of the S. M. York Company and the machinery department of the W. M. Patterson Supply Company, and will continue the business under the same management as heretofore, retaining all agencies formerly controlled by the S. M. York Company. The company are officered as follows: W. M. Patterson, president; Arthur Jones, vice-president; W. H. Smith, treasurer; C. N. Hess, secretary. They will carry a much larger stock than heretofore and will continue at their old quarters, 42-44-46 South Water street.

The Cleveland office of the Marshall & Huschart Machinery Company will remove about January 15 to 119 Bank street, where they will have a four-story building, as well as fine offices. They will carry a complete line of all machinery handled by the company and in the future will make deliveries in this section from this plant. They report that this has been their best year in this territory and the month of December will show a decided improvement over the same month last year. Orders being received are not for large quantities, but there is a general healthy demand for machinery of all kinds. In certain lines they are considerably behind in orders.

William A. Reade & Co. have recently opened a large warehouse at the corner of Mason street and the Pennsylvania Railroad, this city. It has over 10,000 square feet of floor space and is being stocked with a very large line of metal working machinery, engines, boilers, &c. They are disposing of a considerable portion of the equipment of the L. S. & M. S. Railway shops at Norwalk, Ohio, recently abandoned. They report an unusual demand for second hand machinery of all kinds.

The recent fire which destroyed the plant of the Brown Hoisting Machinery Company will undoubtedly create a large market for the sale of machine tools of all kinds, as it is being found, in clearing up the wreckage, that much of the equipment was damaged beyond repair. Manager Tallman of the company denies the report that has been in circulation since the fire to the effect that they will remove to some other city. The writer is authorized to state that plans are being prepareed for a plant to be built on most modern lines. They are investigating very thoroughly into the methods of various kinds of so-called fire proof construction, and propose to spare no expense to forestall any possibility of a repetition of the calamity. It is probable that the plant will be equipped for electric drive of all machinery, with an independent power house. It will be some little time, however, before they will be in a position to place contracts for the new buildings and equipments, as the fire losses have not yet been adjusted. In a measure the fire is to their advantage, since their old plant was an accumulation of buildings built up during the past 14 years and did not possess the facilities for economical production which the new plant will have. It has been found that several of the large contracts on which they were at work at the time of the fire were damaged to only a comparatively small extent, and they will be finished up elsewhere.

The Elwell-Parker Electric Company, who were heavy losers in the same fire, being identified with the Brown Company through the manufacture of their electrical equipments, have closed a deal whereby they will at once take possession of the adjoining plant now occupied by the Pelton Engineering Company. The plant is well equipped for their work. The Pelton Company are devoting their attention to engineering and will open down town offices. They will also open a down town warehouse for the sale of machine tools and electrical appliances.

The Cleveland Twist Drill Company say there has been a pronounced increase in the demand for their tools during the past 30 days, indicating, they believe, a general increase in activity in iron manufacturing trades all over the country. They say that their business is one of the most accurate barometers of the trade extant, since manufacturers seldom buy supplies of drills and small tools until they require them. They are mailing to their friends in the trade a handsomely gotten up booklet illustrating a number of the well-known institutional features of their plant. The book is not in the nature of an advertisement, but is designed as the best possible kind of a reply that can be made to those who desire to become acquainted with the institutional features which they have found of great advantage in the building up of their factory system. The book is entitled "Eleven Little Pictures.

The Oster Mfg. Company, manufacturers of die stock, say their business is a trifle quiet at present, but they are assured of a decided increase after the first of the year. P. E. Ahefeld has recently returned from a European trip, and he reports a very bright outlook for their goods abroad.

The Winton Motor Carriage Company have recently been forced to increase their facilities in order to take care of orders for spring delivery. They have installed an 800-pound Bement-Niles steam hammer, a Niles Tool Works boring mill of large size, several Cincinnati milling machines, Reed and Prentiss lathes and Cleveland Machine Screw Company's screw machines. The majority of these tools were purchased from Strong, Carlisle & Hammond, this city.

The Standard Welding Company have recently received new welding machines, with the aid of which they will be able to produce welded steel tubing up to 16 inches in diameter. Their previous limit in this direction has been less than 8 inches. Tubing produced is made from the toughest quality of steel and the metal at the weld is equal in strength and quality to any other portion. It is claimed that this tube will open up fields for economic manufacture in many lines, as it has a very wide range of usefulness. They will be prepared to make shipments of this tubing in almost any gauge and up to the diameter mentioned about February 15. The Standard Company are adapting their electric welding process in many lines of manufacture where is has heretofore been unknown, displacing brazing and other processes.

The Standard Tool Company have noted a decided improvement in the demand for small tools during the past month and they are behind on orders for certain lines. They are erecting a handsome office building which will enable them to increase their facilities by utilizing their present offices for manufacturing purposes.

Local agents for manufacturers of boilers, engines and electrical equipments are closing some important contracts with electric railways under construction these days. It is stated that shortly after the first of the year there will be more of this business than ever before, as there are a large number of roads under construction and contemplated in the northern portion of the State and a majority of them are financed by local people.

The Sterling Boiler Company has closed a contract for a 1500 horse-power battery of boilers for the Western Ohio Electric Railway Company's power house at St. Mary's, Ohio. The electrical and engine equipments have not yet been contracted for. The road is owned by local

people. The Babcock & Wilcox company have closed a contract with the Youngstown & Sharon Electric Railway for a 2000 horse-power battery of boilers. Engine and electrical equipment will also be required. Park & Hamilton, Youngstown, are the contractors. The Westinghouse Electric & Mfg. Company's local office have closed a contract for the entire equipment of the power house of the Toledo, Findlay & Fostoria Electric Railway. Items not yet specified. The Dover Construction Company, Canal Dover, Ohio, are building the road.

The Chisholm & Moore Mfg. Company, who manufacture the American standard rail joint, say that an immense amount of rail and rail joint business will be closed up shortly after the first of the year. They are now equipping the following Ohio electric roads: Dayton & Northern Electric Railway, 42 miles; Toledo & Western Railway, 60 miles; Sandusky, Bellevue, Monroeville & Norwalk Railway, 35 miles.

The crane department of the Chisholm & Moore Mfg. Company has taken a contract for a 25-ton 55-foot span pneumatic crane for the Franklin Air Compressor Company, Franklin, Pa. They report an unprecedented demand for their pneumatic hoists.

The Vulcanus Forging Company, in addition to forgings, manufacture the Hathaway car transfer table, and this department of their business is rushed with orders. They are just completing a 26-foot transfer table for the St. Louis & Suburban Railway, St. Louis. Their forging department is also very busy. They are just completing the last two carloads of a large order for rivets for the Upson Nut Company, this city.

The Kilby Mfg. Company report that the demand for sugar machinery is just opening up and they have a number of very large contracts in view. It is said that more new plants will be erected in this country this winter than in a number of years. They have closed contracts for plants for two newly organized beet sugar manufacturing concerns who will locate in Michigan. They are known as the Saginaw Sugar Company and the Lansing Sugar Company and their plants will be at Saginaw and Lansing, respectively. The contracts aggregate nearly $1,000,000, and the plants will have a capacity of 600 tons per day each. The buildings will be 70 x 300 feet, and the Kilby Company will furnish everything required to place the plants in running order. The Continental Sugar Company, who installed the first beet sugar plant in Ohio at Fremont last winter, produced over 3,000,000 pounds of sugar during the past season and they have decided to double the capacity of the plant this winter. E. H. Dyer & Co., Cleveland, built the plant.

The Garry Iron & Steel Roofing Company have taken contracts for revolving pneumatic cranes for the Rock Island Railroad, at Bureau, Ill., and for the Canadian & Atlantic Railroad, at Ottawa, Canada. They have recently shipped a pneumatic painting machine to Russia. They are at work on several good contracts for building material and state they expect to close up some large contracts after the first of the year.

The Variety Iron Works have taken a contract for 2000 tons of structural iron work for a large office building to be erected in this city by the Citizens' Banking Company. The Variety Iron Works are completing a fine three-story office building for their own use, adjoining their East End plant. Plans for a large addition to this plant are also being prepared.

The King Bridge Company, manufacturers of steel bridges, are at work on improvements, which will increase their capacity fully one-third. The Rand Drill Company have recently installed in their plant a complete air compressor equipment and a number of pneumatic tools. They are at work on a number of new bridges for the New York, New Haven & Hartford, Lake Shore and New York Central railways, and are building a large rolling lift bridge for the Big Four Railway in this city. It will be 175 feet long, and will have a 100-foot opening. They have just closed a contract for 3000 tons of bridges for a new electric railway, the name of which they are not yet prepared to announce. The closing of this contract was dependent on the result of the election. They state that since the election there has been a decided improvement in business, and they are assured that a number of important contracts will be closed shortly after the new year.

The Cleveland Water Works Department have opened bids on two 450 horse-power boilers with automatic stokers. They were as follows: Sterling Boiler Company, $20,297; Cleveland Steam Boiler Works, $22,155; Campbell & Zell, Baltimore, $17,957. The last mentioned bid was informal.

The Atlas Car & Mfg. Company, who were formerly conducted as the car department of the Atlas Bolt & Screw Company, have recently made a large shipment of mining cars to Peru. The goods were sold through Winham & Merger, their New York agents.

Peter Geriach, manufacturer of stave and barrel machinery, says there has been a decided improvement in his business during the past 30 days, and he has a number of large contracts in view. He has just completed a new crozing, chamfering and equalizing machine, which will produce from 25,000 to 35,000 barrel staves per day.

The Danielson Machine & Tool Company have recently completed a new multiple drill of small size, capable of drilling 112 holes at once. They will shortly announce a compete line of these tools.

Foot, Burt & Co., manufacturers of drill presses, say there has been an increase in the demand for their line during the past 30 days. They are shipping a large eight spindle drill to McConway & Tonley, Pittsburgh, and a large four spindle drill to the Ramapo Iron Works, Ramapo, N. Y. They have recently shipped a number of tools to Manning, Maxwell & Moore, New York.

Bardons & Oliver say there has been a slight falling off in demand for turret lathes during the past month. They recently shipped a number of machines to the Brooklyn Navy Yard.

The Reliance Machine Tool Company shipped a number of their bolt cutters to Moscow, Russia, last week.

The Cleveland Tool & Stampings Company have prepared plans for a new factory building, and will close contracts for material within a few days.

The McMyler Mfg. Company, hoisting and conveying machinery, have commenced work on the foundations of their new plant, at Warren, Ohio. The main building will be 110 x 310 feet, and there will be a large erecting shop. The buildings will be equipped with two 20-ton electric traveling cranes, and will cost about $50,000. It is stated that $150,000 will be spent in new equipment. The date for the completion of the plant is set for May 1. The company have opened temporary offices at Warren, although the local plant and office will be retained until the new plant is completed. They are at work on a 15-ton crane for handling billets for the American Steel Wire Company's Shoenberger works.

The Cincinnati Machinery Market.

Office of *The Iron Age*, Pickering Building,
CINCINNATI, OHIO, December 31, 1900.

In a brief review of the iron working business in Cincinnati for the past year the first important fact which strikes one is that a general period of prosperity is certainly well under way. There has been no dullness in any branch of the business, with the exception of the big falling off in foreign trade in machine tools. This, however, was pretty well offset by the great revival in American trade, and while the machine tool companies' books are not carrying so many orders for future delivery as they were a year ago, yet there is sufficient business on hand and in sight to insure profitable running for some time to come.

The only serious mishap of recent date has been the burning of the foundry and pattern building belonging to the Lane & Bodley Company. The daily press reports of the fire gave it out to be very much worse than an investigation proved. While it is bad enough under the present circumstances yet the company are not crippled to any great degree by the occurrence. The machine shop, power plant, drafting room, together with all drawings, and the office building was saved with but very little damage. The foundry, however, is a total loss, as far as appearance goes at this stage. A general clearing up of the ruins, however, may reveal that even this part of the

plant is not so badly damaged as now appears. The insurance is sufficient to save the company from very heavy loss, except in the patterns, where any amount of insurance would hardly have been commensurate with the value represented. The company have now distributed their patterns throughout the various pattern making shops in Cincinnati and sections tributary thereto, and will be ready for resumption of work at a comparatively early date. If, however, the machine shop had been destroyed, and the other portions of the plant saved, they would have been far more seriously crippled than they now are. It is the general understanding of the trade here that the company have had a very prosperous year, and are in better shape to-day to stand the financial loss than they have been for quite a while.

A shipment of five cars of machinery, being the last of a large order for engines to go to South Africa, had been loaded the day before the fire, and these cars were standing on the track in front of the shops at the time the burning took place. The fact that the work was out of the shops and consequently uninjured, was a matter of great congratulation to the company.

The R. K. LeBlond Machine Tool Company have just put the finishing touches to their Linwood plant in the shape of a very handsome castellated tower surmounting the office portion of the building. The other improvements which have been completed within the recent past consist of the addition of a third floor to a portion of the plant, and the building of a balcony in the second story, giving them altogether a floor surface of 45,000 square feet. They have recently commenced the manufacture of a complete line of plain and universal milling machines, which contain a number of original and patented features such as will make the tool a good seller.

Greaves-Klusman & Co. report quite a revival in business since the election and say that on the whole 1900 has proved a better year to them than 1899. They have added 19 and 22 inch lathes to their output within the recent past. One of the best foreign shipments recently made was four engine lathes to a Spanish seaport.

The Rahn-Mayer-Carpenter Company have just bought the lot 105 x 145 feet in the rear of their present factory, with the intention of utilizing a portion of it for a new building within the coming year. They are also having a railroad switch put into their plant, and are getting out a set of patterns for some new tools to be put on the market in the spring.

The Belmer-Eames Tool Company have been getting out a special tool for attaching to both new and old planers, which enables them to plane very large sizes such as would not pass through the housings, and when attached to a tool gives all the advantage of an open planer.

Cincinnati Machine Tool Company, makers of upright drills, have just put out a new machine with a geared tapping attachment on the spindle, which they regard as a fine thing and expect it to prove of great value in the marketing of their tools. In making a review of the past year they find that in one way or another they have increased the productive capacity of their shop at least 50 per cent. during the period.

The Cincinnati Planer Company have just added several sizes to their line of planers, and are now prepared to make ten different sizes, from 24 to 56 inch, and are working on the patterns for a still larger size. They will start on an addition to their plant shortly after the first of the year. The new building will be a one-story and basement brick structure, 70 x 112 feet in size. The contract is to be let at once, and it is the expectation of the company to double their capacity for manufacturing within the next six months. The present plant is quite crowded, and the addition is necessary to take care of business already in sight.

The Barker & Chard Machine Tool Company are adding a 15-inch shaper to their line of tools. Report business as better in the far West than any other part of the country just at present. The oil well business in California has proved quite a field for cultivating, and some of the best shipments now being made from the shop are going into this class of trade. One of the recent shipments was a 32-foot 24-inch lathe for San Francisco. They are adding some new features to the lathe, but are not yet ready to publish what they are. It is the expectation of the company to have these new features ready for market within the next three months.

The Bickford Drill Company have just brought out an entirely new pattern radial drill, also several multiple drills. The radial drill is an improvement on the old No. 1, with 16 changes of speed, a new shape of arm and built especially with a view of increased stiffness. It is the most powerful machine for its size ever turned out of their shop. They have also added a tapping attachment to it. A short time ago they built a four spindle multiple drill for the Westinghouse Engine Company, which was shipped and put up in the purchaser's shop. That the tool has attracted some attention is evident from the fact that recent inquiries for shop equipments from an English city specify this same tool as the standard for that class of machines, to be put in on the contracts.

The Cincinnati Shaper Company are just getting out a new tool in the shape of a traveling head shaper, in sizes from 18 to 30 inch. These are made with one or two heads, and designed for any desired length of bed. A recent shipment consisted of four single head shapers for the Chinese Eastern Railway at Port Arthur. They have also sold one double head and five single head shapers to the new shipyards at Richmond, Vt.

The Wals & Roos Punch & Shear Company have recently brought out an electrically driven boiler roller, one of the chief features of which is that the motor is keyed right on the shaft, which is a new departure, at least in their shops. For this work it takes a large, slow driven motor, as against the smaller, quicker speed machines needed for the old method of connection. One of this class of rollers has just been shipped to Johannesburg, South Africa. A large horizontal punch was shipped to the Siberian Railway at Port Arthur a week or two ago. The company have also closed a contract for three very heavy machines for the new plate mill of the Simon Mfg. Company of Chicago. They are also just shipping the last of a complete shop equipment for Dyer Brothers Boiler Works, San Francisco.

John Steptoe & Co. report the feature of their trade in geared and crank shapers to be the increasing demand from job and railroad shops, with an excellent trade from street railway companies.

F. W. Watkins, manufacturer of gas and gasoline engines, has just completed the removal of his shops from Covington, Ky., to the southeast corner of Baymiller and Sixth streets, Cincinnati, and his office from West Fourth street to the same location. The present shop will give him an increased output of 50 per cent. over that of the plant he has just vacated. The feature in his line of business is the growing trade with farming communities.

The E. W. Van Duzen Company are just getting out a series of seven catalogues, numbered from A to G, which are arranged with reference to the different classes of trade which require L steam jet pumps, of which they are now averaging about 100 per month.

The Norwood Bicycle Company have, within the past few months, added a line of machine tool specialties to their business in bicycles and are now making handles, ball cranks and other like parts for the trade in general. They report a very good trade, both domestic and foreign. A recent order from an English agent amounted to 3300 ball cranks.

The Triumph Electric Company have recently made some good shipments of ice machines which they manufacture in addition to their line of electrical apparatus, to Batavia, Java. They have also received some very good inquiries from Singapore, Honduras and South Africa, also, strange as it may seem, a request for estimates for a moderate sized ice making plant to be shipped to Alaska.

Houston-Stanwood & Gamble, builders of engines, report a very good trade with the Southern United States. A recent order of 15 100 horse-power engines for the American Cotton Company, for use in their round bale plants. They have also recently shipped a lot of five 150 horse-power engines for a sugar plantation in Cuba.

The Bullock Electric Mfg. Company have enlarged their plant twice during the past year, and have now nearly double the capacity that they had 12 months ago. Not only has the capacity been doubled as to volume of

output, but the facilities for handling large work have been greatly improved, an increase having been made from a maximum of 800 kw. generators to 2000.

The Hamilton Machine Tool Company, Hamilton, Ohio, have added about $15,000 of new machine tools to their plant during the past year, and have also added quite a number of patterns in the radial drill which they are making. They report a very good domestic trade, and say that the business which is drifting in from the mining countries in the West is forming quite a considerable part of daily orders.

The Long & Allstatter Company have just completed a large addition to their foundry which has doubled the capacity in that branch of the business. They have also added a large number of tools to their plant and estimate the increase in capacity through the entire plant at pretty close to one-third more than what it was this time a year ago.

The Advance Mfg. Company, makers of gas and gasoline engines, report a fine business throughout the year and a congested condition in their plant just at present. It is the intention of the company to build and equip a foundry on the lot adjoining their present plant as soon in the coming year as they are able to complete arrangements.

In the matter of the contracts for the pumping engines for the new Cincinnati Water Works, the Board of Commissioners opened and examined the third set of bids on December 21. They were as follows: The E. P. Allis Company of Milwaukee under specifications "A," "B," and "C," respectively, $949,900, $1,004,600 and $1,009,100. The Holly Mfg. Company of Lockport, N. Y., one bid, $927,000. The Kilby Mfg. Company of Cleveland, six different bids, $850,850, $850,830, $849,000 $847,257, $846,757, $846,007. The Camden Iron Company of Philadelphia one bid, $817,000. The plans and specifications covered by the bids of all the contestants are for four triple expansion crank and fly wheel self contained pumping engines, and also include one electric crane. The report of the engineer on these new bids is to the effect that the design of the pump now submitted is a very material improvement over the specifications in the bids of October 16, 1900. The weights of the proposed engine are, that bid for by the Allis Company, 5600 tons; the Kilby Company, 5400 tons; the Holly Company, 5800 tons, and the Camden Company, 5400 tons. The bids, together with the engineer's report, were referred at the meeting of the commissioners to the Committee of the Whole, and action will probably be taken upon them in the near future. There is a strong tip out that all will be rejected and the contracts readvertised.

The New York Machinery Market.

Office of *The Iron Age*, 232-238 William street,
New York, January 2, 1901.

A review of the week just past must consist principally of the enumeration of some of the new properties which have come before the trade, as the business which has closed was naturally of very slight volume. The inquiries received were sufficient to further strengthen the tone of the market and add to the bright prospects of the future. As an instance showing the feeling of the trade here and the tendency among the large merchants, we might mention the fact that one dealer placed a number of very heavy stock orders last week. Another point of significance is that merchants are snapping up offers of second-hand machinery in quick shape. And, incidentally, what is left of the equipment of the defunct Stockton Mfg. Company of Hamilton street and New Jersey Railroad avenue, of Newark, N. J., will be sold at auction within a few days. The original equipment of this concern consisted of many first-class machines which were employed in the manufacture of bicycle parts and specialties. We understand, however, that the receiver for the company disposed of a portion of the machinery equipment a short time ago.

The largest matter brought to the attention of the trade last week was the list issued by the American Car & Foundry Company. The list is said to be a very large one, and includes a large number of heavy tools. They are to be employed in the building of pressed steel cars at a new plant which will be erected at Detroit, Mich. A few of the tools are said to have been already purchased. Westinghouse, Church, Kerr & Co., who designed the plant, are putting the finishing touches to their drawings. The chief offices of the American Car & Foundry Company are located in the Empire Building, 71 Broadway, New York City.

It is stated in the trade that the Philadelphia & Reading Railroad Company are still purchasing considerable machinery. This is in addition to the large lot which they bought a week previous, but is said to be for the new shops also.

It is also reported in the street that the Brown Hoisting Machinery Company of Cleveland, Ohio, have a very substantial inquiry out for tools to replace those which were destroyed in the recent fire at the works. It is said that almost every tool in the plant will have to be replaced, and the works were very large, employing upward of 1200 hands.

Parties in the trade have received private advices to the effect that the Cambria Steel Company have now decided to enter the field of car building. They will build pressed steel cars and will add considerably to their works at Johnstown, Pa., for that purpose.

The American Machine & Foundry Company of Hanover, Pa., have been shopping about for a number of machine tools. They picked out a fair sized assortment of tools from the various stores along the street.

It is stated that the Riker Electric Vehicle Company of Elizabethport, N. J., will require a large assortment of tools to replace those destroyed in a fire which demolished a portion of their works last week.

It is said that certain changes will take place in the offices of two of the prominent builders of water tube boilers.

The order for the boilers to be used in the new cement mill which the Lawrenceville Cement Company are to be build at Bath, Pa., has been placed with the Babcock & Wilcox Company.They will aggregate 1000 horse-power. Vulcan-Corliss engines have also been purchased. The plant will have a capacity of 12000 barrels of cement per day, and is being built with the view of doubling its capacity shortly.

Thomas H. Murray, who is general manager of the New York Light, Heat & Power Company, is purchasing in addition to the large equipment for the Brooklyn Rapid Transit Company which we mentioned last week, a 1500 horse-power plant for the same company. It is to take the place of the small Brooklyn station which was recently destroyed by fire. The new station will be built on the water front, and will be condensing. Mr. Murray is also said to be interested in the purchase of the equipment for the Hilderberg Cement Company of Howes Cave, N. Y., who are to build a large new plant. Another project with which his name is coupled is the Remington Martin Paper Company, who will build a plant at Watertown, N. Y., and will soon purchase the equipment.

The E. G. Spillsbury Engineering Company of 45 Broadway have been purchasing considerable machinery for installation in a large addition which is to be built to the plant of the Carpenter Steel Company of Reading, Pa. The extension will consist of a new rolling mill, heating furnaces and boiler plant. The main new building will be of steel construction, and will be 250 x 100 feet. The mill will consist of 16-inch trains, 12-inch trains and 10-inch trains. The heating furnaces will be of the continuous type. The boiler plant will consist of ten 300 horse-power boilers of the Manning type. The contract for the building has been awarded to the American Bridge Company. The boilers will be furnished by the Bigelow Company of New Haven, and the rolling mill machinery is being built by the Lewis Foundry & Machine Company of Pittsburgh.

Herman Osswald, agent, has taken sole charge of the business formerly conducted by Vieillard & Osswald, manufacturers of the V. & O. presses, the works being at 706 to 710 Jamaica avenue, Brooklyn. Mr. Osswald is in position to do any work in the line of presses, dies and special machinery.

Catalogues Wanted.—Cox & Co., Sudbury Building, Boston, are fitting up a machine shop for the manufacture of box machinery, and desire to receive catalogues and prices on machine shop tools and supplies.

The Chicago and Northwest Machinery Market.

Office of *The Iron Age*, 1205 Fisher Building, Chicago, December 29, 1900.

The machinery trade is in flourishing condition. Manufacturers and dealers without exception report satisfactory business for December, while many of them speak most enthusiastically of its large volume. It is remarkable that those who have been most favored with an increase in orders are manufacturers of engines for heavy duty or makers of machine tools, cranes and other appliances for use in large shops. The contracts for heavy engines have been placed by electric lighting or traction companies, who are greatly improving or extending their equipment. Railroad companies or manufacturers of railroad supplies are buyers of the heavy tools. The demand from manufacturing establishments generally runs to lighter equipment, but helps to swell the aggregate. The outlook for the future is so satisfactory that the manufacturers in every line are warranted in pushing to execution long contemplated improvements. This brings about an increased demand for machinery and power appliances, as shown in the following detailed reports:

Engines.

The Edward P. Allis Company, Milwaukee, Wis., have noticed no indication of a falling off in the demand for engines. On the contrary, there has been an unusual amount of inquiry and they are still handicapped in securing business owing to inability to offer early deliveries. The notable orders received during December consist of a 30 and 60 x 60 cross compound engine for the Northwestern Elevated Railway of Chicago, which is an additional engine for their power house, now containing four such engines; a 26 and 52 x 48 direct coupled vertical engine for the Carnegie Steel Company, which is a duplicate of an engine supplied them some two years ago; a 46 and 94 x 60 vertical cross compound direct coupled engine for the Chicago Edison Company to drive a 3500-kw. generator, and a vertical blowing engine, with steam cylinder 80 x 60 and air cylinder 84 x 60, for the American Steel & Wire Company for their Shoenberger Works.

The Filer & Stowell Company, Milwaukee, Wis., have about completed plans and specifications for an erecting shop. Parties desiring to bid on this work will send in their addresses to the company and the approximate time it would take them to complete a building 300 feet long by 80 feet wide by 61 feet to the rafters. This building will be constructed of steel, with brick filling on piling. They prefer to let the contract as a whole, 200 feet to be finished if possible by April 1 and the remaining 100 feet by May 1 or at latest June 1. It is expressly desired that no one should call until they are requested, because there may be some delay in the completing of the plans.

The Nordberg Mfg. Company, Milwaukee, Wis., have found a very decided increase in inquiries and no decrease in orders actually placed. They have not booked any specially noteworthy orders during the past month, principally because they were already filled with work for 18 months ahead.

The Vilter Mfg. Company, Milwaukee, Wis., have closed contracts within the past month for a great deal of refrigerating machinery and Corliss engines. The refrigerating machines include one 250-ton, one 150-ton, one 100-ton, three 75-ton, three 50-ton, one 35-ton, five 25-ton, one 20-ton and two 15-ton, and have been purchased by parties in Mexico, California, Minnesota, Wisconsin, Illinois, Ohio, Pennsylvania and the District of Columbia. The Corliss engines comprise one 22 x 42 inch, three 20 x 42 inch, one 16 x 42 inch, three 18 x 36 inch, one 16 x 36 inch, one 14 x 36 inch, and two 14 x 30 inch, and have been bought by parties in Wisconsin, Iowa, Louisiana, Texas and Pennsylvania.

A large engine building plant is projected at Milwaukee by the Brown-Corliss Engine Company. A prospectus has been issued by Cassius M. Paine, who is interested in the organization. The capital stock is to be $1,000,000, half preferred. The product of the proposed factory is to be confined exclusively to engines of the Corliss type ranging from 100 to 5000 horse-power. It is estimated that the plant will cost, approximately, $325,000, which would leave a working capital of $175,000, if the present plan of organization on a basis of $500,000 preferred stock is adhered to. The gentlemen who are expected to take active management of the business are T. W. Phillips of Providence, R. I., as president, in charge of the sales department; Walter F. Brown of Milwaukee as vice-president and superintendent of the plant, and Charles Rhode of Milwaukee as treasurer and business manager.

Boilers and Pumps.

The S. Freeman & Sons Mfg. Company, Racine, Wis., say that their business for the month of December has been very satisfactory. They entered more orders during the month for all kinds of boilers than they ever did in one month before. Their agricultural implement business is also very good. Notwithstanding their utmost endeavors they are unable to keep pace with orders. Among the improvements which they have recently added to their factory is a new galvanizing plant capable of galvanizing 6 tons of material per day. This improvement they had to make in order to take care of their wind mill business, which is growing very rapidly. They have also installed a new 250 horse-power Allis Corliss engine and a new air compressor capable of furnishing 300 cubic feet of free air per minute, and also a 100 horse-power generator, with quite a number of motors for electric transmission of power. If business continues good they expect next spring to enlarge their boiler shop by adding to the main building an extension of 100 x 110 feet, and will put in another electric crane and a hydraulic riveting machine with an 8-foot stake.

The American Steam Pump Company, Battle Creek, Mich., say their business for December compared favorably with the preceding months of the year. Their year's business will show an increase of 10 per cent. above 1899. They believe that 1901 bids fair to be as good a year as they have ever had.

The Union Steam Pump Company, Battle Creek, Mich., are very well satisfied with their business in the Northwest, considering the season. They now have contracts for over 3000 pumps for future delivery, which, of course, makes them feel very easy. From the manner in which orders are coming in by mail they feel that the trade for 1901 will be equal at least to that of 1900. With the settling of raw material to a normal condition there is evidence of a steady, healthy business. They are again enlarging their plant.

The Gardner Governor Company, Quincy, Ill., found their business for December below that of November, but equally as good as any December of previous years. They attribute the slight falling off to the annual stock taking custom, expecting January to be a good month. They say they have every reason to believe that the coming year is going to be a prosperous one for all manufacturers.

Power Transmission Appliances.

The Dodge Mfg. Company, Mishawaka, Ind., say that their business during the month of December has been satisfactory and fully up to the standard of previous years, with stronger indications for activity in the coming year than they have ever noticed in any previous December. They are planning a number of enlargements and improvements to their plant.

The W. A. Jones Foundry & Machine Company, Chicago, have completed all the buildings for their new North avenue works. The foundry, machine shop, warehouse, office, engine and boiler rooms, and power and electric light plants, cover an area of 1½ acres of ground. All the tools and equipments are new and of the latest design, and, besides the usual machine tools, include a 12-foot Niles boring and turning mill, a 14-foot Pease planer and two of their own new lathes. These improvements have increased their capacity 50 per cent. They have brought the melting capacity of the foundry up to 20 tons per day. They report a good demand for machinery and power transmission appliances. They also report an increase of business in 1900 over that of 1899, and their December trade was better than that of the previous few months and of the corresponding month in

1899. Both their city and country trade are improving excellently and the prospects for 1901 are of the very best.

The Chas. Munson Belting Company, Chicago, have closed a contract with the American Cooperage Company, Peoria, Ill., for furnishing them with belting and supplies the year round. A heavy increase in business is expected for 1900.

The Moloney-Bennet Belting Company, Chicago, are furnishing belting to the Goodman Mfg. Company, Chicago, and to the two plants of the Quitman Lumber Company, Quitman, Miss. Prospects for 1901 are very promising.

Machine Tools.

McDowell, Stocker & Co., Chicago, report their December trade better than that of December, 1899. They have furnished the Goodman Mfg. Company, Chicago, with machine shop equipment; the Port Huron Mfg. Company, Port Huron, Mich., with lathes and other tools for the manufacture of agricultural implements; a carload of machine tools for the Davis Sewing Machine Company, Dayton, Ohio, and a machine shop equipment to the Johnson Glass Company, Hartford City, Ind. Their railroad trade has been very good, and they have received many small orders for tools. Their trade in 1900 exceeded that of 1899, and the prospects of the coming year are promising.

Hill, Clarke & Co., Chicago, report trade very good. The city trade is improving and the country trade is up to the average. They are now refitting the plant of the Duplex Printing Company, Battle Creek, Mich., and installing a grinding machine, a planer and five lathes. Their largest orders are for additions to established shops, and their railroad, electrical and agricultural trade is improving. The railroads usually require general shop tools, while the other orders call for drilling and punching presses in addition to regular machine shop tools. Their trade in 1900 was as good as that of 1899, which was the best in the history of their establishment. The December trade kept pace with that of the previous three months.

Rudolphi & Krummel, Chicago, report their trade in a flourishing condition. Their main orders have recently been for stamping machinery, especially for their new style, long stroke presses. They are equipping a part of a large plant for making pieced tinware in St. Louis. The business of the year 1900 was greater than that of the previous year. While the December sales were larger than those of the same time in 1899, they were less than those of the previous three months.

The Northampton Emery Wheel Company, Chicago, have just shipped an automatic planer knife grinder to the Moscow branch of the Singer Mfg. Company, Moscow, Russia.

The Machinists' Supply Company, Chicago, will remove from 15 and 17 South Canal street to 16 and 18 on the same street, about May 1. An increase in business has necessitated the removel to larger quarters.

The New Doty Mfg. Company, Janesville, Wis., say their business for December has been up to the average, and all that they could do. They have been making some enlargements to their machine shop and are now putting in a traveling crane of about 20 tons capacity. They think the indications are favorable for a good volume of trade for the coming year.

Hoefer Mfg. Company, formerly the Stover Novelty Works, Freeport, Ill., say their business keeps up and they have bright prospects for the future. They are getting out a new gang drill and also a horizontal drill, both of which they believe will prove valuable tools to the manufacturer.

Perry Ransom, Oshkosh, Wis., says that business in December was better than during the month of October and early November. There was never a time when he felt so sure of the future as at the present. There has been some dropping off in foreign trade lately, but he believes that the home market is going to be strong enough to overcome this.

The Standard Pneumatic Tool Company, Chicago, report an increase in trade in 1900 of 100 per cent. Their business in Germany, France, Belgium, Great Britain, Australia, South Africa and Canada has increased enormously, especially the demand for their Little Giant labor saving tools, which seem to have excited the opposition of the Europeon workmen on account of that quality. The increase for their tools has been mostly from the shipbuilders, dock and pier constructors, boiler makers, and the allied trades. The company are furnishing the United States Navy with machines, and have many large contracts on hand. They expect to put a number of new tools and machines on the market this season, and with the excellent prospects await a large increase in their business. They report that the month of December, 1900, has been the banner month, not only of the year, but of the history of the establishment.

Chas. H. Besly & Co., 10 and 12 North Canal street, Chicago, report business very good in fine tools, manufacturers' and machinists hardware, &c. The receipt of many inquiries for their catalogue, together with requests for estimates on tools and material, indicate increased business for the year 1901. Recent orders for complete equipments of small tools and supplies have been received from Ohio, Indiana, Iowa, Texas, Kansas, Nebraska, Montana and Utah. Many letters are being received from foreign countries asking for circular matter and full particulars regarding their specialties, and shipments have been made to Buenos Ayres, Montevideo, Brazil and England. Numerous orders are being booked for their Gardner grinders, the special feature of which consists in the spiral groved disk. Shipments have recently been made to Ohio, Connecticut, Pennsylvania, New York and Massachusetts. They are very busy at their factory at Beloit, Wis., and by the addition of new and special machinery they have increased their output fivefold.

Mining Machinery.

The Gates Iron Works, Chicago, have in the past few months installed a new 80-foot span 20-ton electric traveling crane and equipped their machinery shop with six heavy lathes, four boring mills and other new tools. These improvements, together with an important addition to their power plant, have increased their capacity 40 per cent. and enable them to meet more promptly the orders which are coming in. They report a steady increase in business, especially their South American and Australian trade, which is the best that they have had. The increase in their export trade in 1900 over 1899 was about 25 per cent., while the increase in their entire trade was 40 per cent. The year 1900 has been their best year, especially for foreign trade, except in 1895, that the company have ever had. They have a number of large contracts on hand, and on account of these and the promising prospects their facilities will be increased, the plans for a large foundry having already been submitted.

The D. Clint Prescott Company, Menominee, Mich., state that the amount of business done in December is one of the largest in the history of the company. They have orders enough ahead to keep them running night and day full capacity for many months, all for saw mill and mining machinery.

Foundry Equipment.

The Maywood Foundry & Machine Company, Maywood, Ill., have put on a night force in order to meet their incoming orders. They report that their trade in 1900 increased 100 per cent. over that of 1899, and the prospects could not be better.

The Whiting Foundry Equipment Company, Harvey, Ill., state that business has been satisfactory for December, although not as large in volume as they had hoped. The preceding months were considerably better. They are having many inquiries and opportunities of making quotations, consequently have much hope for the future. Owing to congested parts of some of their shop and for the convenience of some of their mechanics they are putting up a blacksmith shop, 40 x 100 feet.

The Adams Company, Dubuque, Iowa, say that their sales of molding machines the past few weeks have been beyond their expectations. The demand for strip-

ping plates and special molding machines in agricultural foundries is increasing very fast. The interest taken to-day in molding machines is greater than ever before. They never were so busy with the Farwell molding machines as now, and for the past two years have always had orders ahead to fill. The coming year in their opinion will be the most encouraging with which the American manufacturer has been favored. In order to take care of their increasing business a two-story machine shop building is being erected, the foundation of which is completed, 76 x 120 feet. A boiler and pump house, 30 x 100 feet, will also soon be completed.

Cranes.

Pawling & Harnischfeger, Milwaukee, Wis., are enjoying a very satisfactory demand for their electric traveling cranes. They have recently received orders for two 10-ton, one 15-ton, one 20-ton, one 30-ton and one 60-ton from the Risdon Iron & Locomotive Works, San Francisco, Cal.; one 10-ton from Sullivan Machinery Company, Chicago; one 25-ton, Edward P. Allis Company, Milwaukee; one 30-ton, Kingsford Foundry & Machine Company, Oswego, N. Y.; one 10-ton, Goodman Mfg. Company, Chicago; one 15-ton, Vilter Mfg. Company, Milwaukee; two 15-ton, American Clay Working Machinery Company, Willoughby, Ohio; two 20-ton, American Clay Working Machinery Company, Bucyrus, Ohio; two 30-ton, Gruson Iron Works, Eddystone, Pa.; one 5-ton and one 10-ton, Edward Ford Plate Glass Works, Toledo, Ohio; one 30-ton, Tennessee Coal, Iron & Railroad Company, Ensley, Ala.; one 25-ton, Parkersburg Iron & Steel Company, Parkersburg, W. Va.; one 25-ton, Northwestern Steam Boiler Works, Duluth, Minn., with the usual complement of hand cranes, electric hoists and trolleys. The outlook for 1901 in their line is very promising, and they are anticipating a steadily increasing volume of business.

The Industrial Works, Bay City, Mich., report their business in volume about the same as a year ago, and, altogether, very satisfacory. Orders are reasonably plentiful and prospects are good.

Miscellaneous.

The Novelty Iron Works, Dubuque, Iowa, report a very marked improvement in the condition of trade covering the past six weeks. The demand for their Boss power hammer has begun much earlier in the season than was expected, shipments having already been made to numerous points in Illinois, Ohio, California, Kansas and Minnesota. Orders for shingle sawing machines have been received from California, Texas, Georgia, North Carolina, Illinois and Tennessee. Several important improvements have been recently added to the Boss trip hammer, upon which patents are pending. The company are finding some difficulty in obtaining good mechanics, which necessitates operating the works at night. Prospects for the future are even better than they have been for the past two years.

The Stover Mfg. Company, Freeport, Ill., say that the press of orders is so great that it has been impossible for them to close down to take stock. The prospect for 1901 is very flattering, and they are now planning to erect a new factory which will enable them to more than double their output, but it will not be ready to occupy until late in the summer or early fall. The sales for the year just closed are practically the same as for the previous year. For two years they have been working up to the full limit of their capacity, with no possibility of increase until possessed of larger facilities.

The Vulcan Iron Works, Chicago, report their December business slower than that of the corresponding time in 1899. They have just completed five large ammonia compressors. Their business in 1900, however, exceeded that of 1899, and the prospects for this year are bright.

The partnership heretofore existing between W. A. Sharp, Geo. H. Klumph and P. L. Sisson, under the firm name of Sharp, Klumph & Sisson, importers and general dealers in flexible metallic tubing, has been dissolved by mutual consent, P. L. Sisson retiring from the firm. W. A. Sharp and Geo. H. Klumph will continue the business, and hereby assume all liabilities against the firm of Sharp, Klumph & Sisson.

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HARDWARE.

The Trade Outlook.

The Past Year.

Whatever may have been the result in individual cases of the business of the past year, the year will probably be remembered by most as characterized by more than the usual measure of success. Nearly all manufacturers have experienced a good demand for their products, and at reasonably remunerative prices, while merchants generally have transacted business which in volume at least is beyond the average. The year is memorable as witnessing the collapse of the boom of 1899 with a certain and radical break in prices, which interfered with the movement of trade and threatened for a time to be attended by still more serious consequences. One of the notable features of the business of the year is the rapid recovery after the break and a return to the confident and healthful tone with which the new year opens. The period of depression has been brief. Very quickly has a new and apparently solid basis for trade been reached, and already there is a movement of business and a spirit of confidence in commercial circles and among the people at large, which promises well for the year on which we have entered. The fact that this transition from abnormally high prices to the level of more nearly normal prices has been effected without any financial revulsion—indeed, without serious loss to the mercantile community—has also had important part in making up the record of the good fortune of the year. Few failures of significance to the trade at large have occurred. Financial conditions at the present time are excellent. In this respect as in others there is nothing to justify apprehension of financial disturbance in the near future. 1901 opens with the country enjoying prosperity which is duly shared by the Hardware trade.

Condition of Trade.

Few factories enter upon the year with empty order books. With most manufacturers trade continued in good volume even to the end of December. Orders have been partly to supply the pressing needs of customers and partly for next season's business. Orders for goods needed by jobbers and retailers to keep their stocks in shape have been coming in with urgency and frequency reflecting the activity of business throughout the country. There has been something of a disposition not to be in a hurry about purchasing for spring or summer delivery, but a great many such orders have been placed. Many manufacturers are working with a view to accumulating a stock of goods so as to be in a position to meet the demand which is soon expected and with a good degree of confidence that there is little risk in doing this.

Tone of the Market.

Prices show very little change. Most lines are held steadily. In some concessions from recent prices are being obtained, but in others there is a decidedly firm tone, and some slight advances are taking place. The general feeling is that lines which are not under suspicion on account of being held at unreasonably high prices or otherwise especially likely to decline are to be bought in such quantities as trade requires in the near future, the probability being that there will be an opportunity to work them off in the regular course of business. The likelihood that prices will sooner or later be lower than at present is generally conceded and there is accordingly little disposition to buy in excess of early needs. The liberal movement of business encourages a bolder policy than would otherwise be justified.

Successful Business Systems.

Among the many problems which present themselves to a growing concern the somewhat perplexing ones are those which relate to the proper dispatch of business. This has been especially exemplified in the case of those large combinations in the manufacturing business which are of recent formation. A number of discordant and conflicting systems were thrown together on very short notice and the wonder is, not that the problem has not been satisfactorily solved, but that so much has been done toward its solution.

It has been found that good systems, like all other things of value, take time to perfect themselves, and cannot instantly be put into successful operation by a mere edict. Take the case of a large aggregation with a central office in a great city and a dozen factories scattered over the country within a radius of 500 miles. It is plain enough, though the fact is often lost sight of, that there has been amalgamation but no real concentration. This soon shows itself in a most persistent way. An order from a customer goes to the central office—it embraces many items, so many in fact that half a dozen of the factories are involved in the manufacture of them. The order must be inspected by the credit department and the order department at least—probably some other department has to see it. It has to be split up into the various items belonging to the respective factories, and as it is only one of hundreds of other similar orders, it becomes at once a serious problem how to put the necessary machinery in motion to get that order, in its several subdivisions, promptly into the hands of the different factories. Once at the mill it has to take its chances along with the multitude of its fellows. It may get buried beneath a mass of other orders and entirely overlooked for a time, or it may get misplaced and absolutely lost sight of.

A mill superintendent is primarily a manufacturer and it is scarcely to be expected that he will have a proper appreciation of the question of the distribution of his products.

On the other hand any system at the central office which automatically keeps track of orders at all points has the tendency of all such systems to become mechanical and to be largely disregarded by those against whom they are directed. Details multiply so that if the index to them be lost it is almost hopeless to attempt to find anything.

If a customer writes in and wants a particular item on a certain order and fails to give the correct date of the order and the manufacturer's serial number, or some other distinguishing characteristic, it is usually impossible to locate the item without an amount of labor that is not to be considered.

The same thing is true of correspondence. It is not an easy matter to get a prompt, intelligent reply to a letter, as a great many merchants will testify. Yet, in

spite of all these things, it cannot be denied that there has been a steady and constant improvement in expedition and dispatch of business. If the railroads after years of experience have surmounted these difficulties, they should not prove insurmountable to our manufacturers.

Experience shows that prompt and intelligent execution of business is of quite as much value to a concern as the offering of attractive prices, and every one of these widely scattered aggregations must certainly have in mind, as a spur to increased diligence, the vision of a competition that is very near realization—that of a strong concern, centrally located, compact, well in hand under one dominant personality and because of its real concentration having a maximum of dispatch with a minimum of detail and system.

Personality in Management.

Sufficient time has elapsed since the formation of the large combinations in the Steel and Iron business to illustrate how often the secret of success is the personality of the management. Location, discipline and organization count for but little unless backed up by brains and judgment at the helm. What is most needed, as ever in the past, is a dominant personality impressing his own individuality upon all connected with him, and supplying that cohesion and enforcing that harmony without which success is impossible.

"One man power" is as vital as ever to success, especially if the "one man" in "power" has the faculty of selecting capable lieutenants. Already the growth and further expansion of these aggressions are "up against" the problem as to what extent and how far the human brain can grasp and solve the constantly increasing difficulties which beset the path of all growth. The strain and responsibility seem to be too much for this one man to bear and the constant cry is for men of ability and experience to share the load of those in authority.

Special Reports.

Chicago.

The Chicago Hardware jobbing trade never saw such a week for the closing month of the year as the one just passed. The demand kept up as well as if it was the hight of the season instead of the usual stock taking period. The decline in Screws appears to be taken as a mere incident of business and not as an indication of general weakening. Buying is in liberal quantities, and no longer merely from hand to mouth. The volume of business has been considerably stimulated by large shipments made to Western points at special freight rates which expired with the end of the month. The condition of trade is considered perfectly healthy. Jobbers have for some time had no cause to go through their various departments and make special efforts to move goods having a slow demand. The Heavy Hardware jobbers have been equally favored with good business, and are looking forward to a splendid year.

St. Louis.

The wind up of the year has been said to be most satisfactory to the trade. So far as ascertained sales exceed in value those of 1899. One interest places the increase at 20 per cent. Probably more than the usual effort was made to push the inventorying of stock, work being continued well into the night at the close, and at some sacrifice in filling customers' orders promptly. December, which is considered by some as good for, say, only 60 per cent. of the average month, has in this case proven to be the year's best month. Tonnage for the same month was extraordinary. Indications for business for the next 12 months are very bright and beyond anything, say some jobbers, the trade has ever experienced.

Boston.

Bigelow & Dowse Company.—Those of us who have passed the greater portion of our lives in the nineteenth century may well pause and reflect on the wonderful changes that have developed since we were able to see and understand, and judging by the past study what the few remaining years of our lives have in store for us we pass on to the new century. In the years 1875 to 1880 four salesmen sold the same amount of goods as 20 salesmen sell to-day.

The yearly traveling expenses of the four was $2000; that of the 20 is $35,000.

The net profit on a business of $200,000 to $300,000 then was greater than that on a business of five times the amount to-day. Then the manufacturer asked a profit and the jobber willingly paid it. He sold his goods at a profit, the retailer made his and every one was happy.

It is a fact that in the past the retailers made more money and prospered when the wholesale trade was also prospering.

There is a story told of a merchant from the far West who had looked over a dealer's line of Cutlery but did not buy at the time. He waited a day or two before going to the store again. Soon after he entered the dealer told him he had decided to reduce the prices first given on the Cutlery. At this the merchant said he did not wish to buy at the lower price; the higher the better. He marked his goods at a percentage advance on the cost and the higher the cost the more money he made.

It is a sad commentary on the conditions existing now when we note the failure of one of our oldest and most respected retail houses established in the early part of the century; the profits made its founders and many of their successors wealthy, but it could not battle against present conditions.

The discovery and introduction of the telephone and typewriter and the various electric appliances only help to increase the expenses of to-day. Catalogues costing many thousand dollars add their share. Formerly our customers came to us and it was considered little less than a crime to ask another's customers to come to your store or to solicit their trade. Now we go to the customer and use every device to lure them away from our neighbor. The traveling account adds largely to the expenses.

As the years progress the cost of doing business under the present conditions must steadily increase, and what can be done to reduce expenses so that we may sell our customers at a less price and still have a profit at the close of the year?

Our answer is consolidation. The old adage that "Competition is the life of trade" does not seem to work just right in the present times. When we see the results of the management of large numbers of manufacturing corporations under one head why is it not possible and proper to make such consolidations of business houses? There is no question of the great economies that would result. The writer believes that we will not have advanced very far in the new century before consolidation of business houses will be as popular and widespread as it is now with manufacturers.

The business the past year has shown a greater or less loss in sales each month. Since September the volume has steadily increased until the present month, when it exceeds that of December, 1899. The present outlook is for a large volume of business the coming year.

Values may vary, but the tendency of prices must be down to a lower level.

Louisville.

W. B. Belknap & Co.—The year closing finds our section of the country in high spirits for the approaching new year and new century. It has not been a year, as many we have known, which everybody seemed glad to get rid of.

It had its good things for the nation and for individuals who were hard at work throughout its length and breadth, and these were bestowed upon us in all sorts of shapes, from elections to dividends on common stock.

There are always some pessimists who find voice in

public prints and in after dinner speeches, who would have us believe that because we are not exactly as our Pilgrim fathers were, or because not all of us can sit down and write from memory the Constitution of the United States, as written for us by the fathers of the Republic 100 years ago, therefore we must be on the high road to destruction, and that Cuba and the Philippines are but the commencement of our national undoing. It must be a very small circle, however, in which these gentlemen pass as seers. There is really too much going on in a large way for us to hunt around with a microscope for trouble.

Each State and each municipality has its own problems to wrestle with, some of them very ugly ones, but we imagine that the better and higher powers of man were implanted for active exercise and it would be strange indeed if they were not called in play.

The year opened with doubt as to the Iron and Steel markets. There had been a heavy reaction from the high prices of the early part and middle of the year previous. The decline was quite precipitate when it once started and people began to wonder where it would stop, while others were as ready to predict absurdly low prices as they were willing to stake their prophetic reputations on the lofty hights attained a short time before.

There was a new factor, however, to be dealt with which had never before cut any figure—viz., the large consolidations. While the prices were allowed to go down to what was apparently an unprofitable plane, it seemed to have been done with a purpose, and as soon as this purpose was accomplished strength began to manifest itself; large orders were taken from the bridge companies, car companies, agricultural machine factories, machine shops, &c., which gave assurance of ample occupation of rolling mills for some time to come. The production of Pig Iron decreased steadily, and by the latter part of the summer was far below what it had been at its climax. Meanwhile the consumption began to eat into the piled up stocks till latterly the strength and confidence in the market has been regained.

As soon as the election was over the buyers came into the market freely for their wants for six months or a year to come. This has resulted in advances which seem to be substantial. Steel Bars and Iron Bars have been advanced $4 to $5 per ton at least.

Meanwhile the large concerns have added to their productive capacity, new and improved machinery has been put in and America is taking her place rapidly as the foremost Iron and Steel country in the world. In fact it has already become so, Great Britain reluctantly taking second place. Improved transportation has practically put the Pittsburgh district at the seaboard. We expect to hear of still greater triumphs than those yet achieved on foreign shores.

There is every prospect of a good year for 1901 for rolling mills and foundries. There never was as much new work projected, never such ample capital to care for it.

The market is steady in various lines. There is no apprehension of much advance, as large additions have been made to manufacturing plants during the profitable year or two past. At the same time every shop and construction company is full of work, with prospects of more coming in in due course of time.

Omaha.

Lee-Glass-Andreesen Hardware Company.—As we have noted for some time past, the movement of all kinds of Hardware still continues up to a high standard of activity, the demand coming from both the agricultural and mining districts.

Taking the closing year as a whole the general result may be summed up as quite satisfactory. Not only has the total volume of business been considerably in excess of any previous year, but competition in the matter of price cutting has not been so severe as formerly, so that a respectable balance on the preferred side of the ledger is practically assured.

The outlook for the coming year seems equally promising, as all accounts agree that the tributary country is in a prosperous and flourishing condition. There are no signs at present of any serious interruption to the present favorable conditions, and it is commonly predicted that the year 1901 will equal, and very likely surpass, in volume of business any of its predecessors.

Cleveland.

The W. Bingham Company.—Trade for December was unusually good, closing a year of probably the largest volume of business ever done in the Hardware line.

How satisfactory are the results is somewhat problematical.

To those who inventoried their goods at the colse of 1899, at their cost, it should have been a very profitable year; to those who did not, but took them at their market value, they have probably found their large business a delusion and a snare, for with very few exceptions prices have been continually declining.

Many combinations have been formed, only to be broken, and the buyer's lot for the past year has been anything but an enviable one. The following might be considered a fair analysis of the business for the past year.

Builders' Hardware, at the opening of the year, was in very light demand, owing to the variation of the prices for building material in general, but as the year progressed the prices began to assume their normal values, trade brightened up, until in the fall, when it assumed very good proportions, and the outlook for next year is most excellent.

Tools were in very good demand, with the exception of the spring and early summer, when the machinists' strike was in progress.

The demand for Agricultural Tools, &c., was curtailed by the high prices asked by the association makers.

Factory supplies were sold largely the first half of the year, but the demand slackened, when the prices on manufactured goods began to decline and factories were consequently less busy.

Many contracts for next year are being placed, or are being figured on at present.

House Furnishing Hardware was fairly steady, both in price and demand, the whole year. The same thing might be said of Wire and Nails.

There were very few failures and collections were good throughout the year.

Nashville.

Gray & Dudley Hardware Company.—A careful review of the Hardware trade for the last year of the nineteenth century reveals many interesting facts—more than we can enumerate in this short article.

The pessimist of 12 months ago is to-day a prophet without a job; his prediction of low prices, dull trade, financial disaster and that the country was bound to go to the "demnition bow-wows" on account of its being a Presidential year has not proven true.

We took occasion to say about 12 months ago that we believed some goods, the prices of which were controlled by trusts or combinations, were too high, but that prices of Hardware generally were not higher than necessary to bring a reasonable and just return for capital and labor invested in its manufacture. Since writing the article referred to above some advances and declines have occurred, but nothing has caused us to change our opinion. The most marked declines in prices during the past 12 months have not surprised any one, except perhaps as to the particular time they occurred. Every one knew that Nails, Wire and Screws were sure to decline sooner or later. Hardware manufacturers abroad now realize that the American manufacturer is to be their most formidable competitor in the markets of the world. With fuel and ores growing scarce in many foreign countries, and with the demand for Hardware increasing both at home and abroad, we see no reason why the American manufacturers, if they continue to push the now rapidly growing export trade, cannot find a market at remunerative prices for their product without glutting either the home or foreign market.

As we view it, the prospects for business in 1901 are exceptionally fine. We have many evidences of prosperity. Close investigation leads us to believe that the farmers, merchants, miners, manufacturers and people generally are in better financial condition than they

have been for a number of years. One evidence of this is the unprecedented holiday trade enjoyed by the merchants of this section, which was almost exclusively on a cash basis.

In closing this article we hazard the prediction that the wide awake Hardware jobber, who gives his business the attention it deserves, will not be ashamed of his trial balance at the end of 1901. We wish *The Iron Age* and all its readers a happy New Year.

Portland, Oregon.

CORBETT, FAILING & ROBERTSON.—In review of the market for the closing year of the nineteenth century it is a profitable pleasure for us to say, "We told you so." The writer attended the 1899 meeting of the National Hardware Association at Pittsburgh, and after adjournment journeyed East as far as Boston. What surprised him was the evident confidence in the market, expressed by manufacturers and jobbers everywhere, views with which he could not agree. I remember well a conversation while lunching with two prominent Hardwaremen of Philadelphia, who expressed a confidence in the market for a long period ahead that was surprising. If they and others backed their judgment by liberal purchases, as is to be supposed they did, the loss must have wiped out a large percentage of the gain accruing in the '99 advances. In *The Iron Age* of May 3 we expressed our satisfaction with the position taken by John W. Gates, and again in the edition of May 17 commented on the prices of Chain and Wrought Pipe, that within a short time thereafter struck the toboggan slide. Now Screws and Wire Cloth seem to be a little under the weather, and it would be better if Axes and Shovels were inoculated with some of the same virus. Early in '99 we bought a year's stock in many lines and in some a two years' stock, but we did not do as many did, try to undersell the manufacturers, but took all the profit they and the good Lord and the law allowed us up to 200 per cent. on Pipe. Since then we have endeavored to let the powers that be carry all the stock and take all the chances, as they have been making most of the profit. It has worked well, and we now look forward into the new century with pleasure, expecting again to put on our floor capital in the shape of goods that has been lying idle in the bank. For one who likes to buy freely and take some chances on advances when the situation warrants it, the outlook is much more promising than one year ago to-day.

In the nature of things as they now exist, "booms" in the Iron, or rather the Steel, market, cannot be as long lived as formerly. The 80 and 90 pound Steel Rail that has supplanted the old 45-pound Iron insures a life that requires renewal only in a long period of time. The new territories that in the 70's invited immigration are now occupied, cutting off the abnormal demand occasioned by waves of immigration that went forth to occupy the wastes and create a demand for everything applying to the Hardware, Iron and Steel business, and finally Yankee ingenuity and Western push have developed a capacity to manufacture, often dormant, that, when called on, brings forth such a flood that a reaction is bound to follow, giving the market time to digest its gorged fullness.

We are pleased to note the attitude of the Washington Hardware dealers as expressed in *The Iron Age* of December 20. This is a vital question that will soon have to be met by jobbers, and the equity is with the retailers. The sooner firms are forced to declare themselves and line up exclusively as jobbers or retailers the better for all parties concerned. God speed the day when decision must be announced.

Philadelphia.

SUPPLEE HARDWARE COMPANY.—Trade coming to our city through salesmen during the last month of the year we believe was unprecedentedly large in volume and no diminution was visible up to the day preceding Christmas. We cannot erase from our mind the sights seen in our city during the two weeks preceding the Christmas holidays. Never before during that season has there been seen in our city such an enthusiastic throng of shoppers as crowded the streets in which are located the retail stores. We could not, however, dismiss the thought that the millions upon millions of dollars spent for presents for friends and the loved ones at home would have benefited a greater number of retail dealers could it have been scattered through a thousand channels instead of through a limited few enormously large concentrated channels of what are known as "department stores." The cheerful appearance of the tens of thousands of employees indicated well satisfied and paid workers, as money in almost countless amount was hurriedly passed from their hands into the coffers of the various firms. The sights in these stores as thousands after thousands passed from counter to counter in the grand hustle of being waited upon was a thing never to be forgotten, and we ask ourselves, What does it all mean? It means the savings of the last two years were not only depicted upon the faces of thousands of buyers, but would be more fully realized if the savings of many as shown in their bank accounts with the trust companies could be seen.

The smokeless chimneys which existed in our city a few years ago have du›ing the past two years belched forth smoke reaching into the clouds, the wheels of machinery have moved with a rapidity heretofore unknown, manufacturers have with some degree of difficulty found sufficient intelligent help to satisfy the demands made upon them for goods, and there is no excuse for either man, woman, boy or girl of intelligence, good appearance, capacity and ability remaining idle.

We freely admit that the manufacturing industries have profited to a far greater extent during the recent period than the distributers of the product. The jobbing trade of the country, acting as first distributers, and the retail merchants, representing that class who cater to the wants of the various consumers, are alike surrounded by circumstances which in themselves prevent anything beyond a carefully considered legitimate profit.

Steam, electricity, telegraph and telephone wires distribute information of the market values of the products of both farm and mill from one extreme of the country to the other. Trade journals keep the trade informed and discuss values as well as causes and probabilities. The entire 4,000,000 square miles of territory when reduced to acres require 2,200,000,000 of them to tell the story. This vast field is inhabited by 76,000,000 people, who live in a country where opportunities are open far in excess of any other nation that the sun shines upon, who are better fed and better clothed than the inhabitants of any other known country. And we have now just entered upon a century in which we practically control the prices of the world's product of farms, mines and mills. It has further become apparent that the destinies of other countries are influenced by the voice, action and decision of our nation. Our army and navy through events not of our own seeking, but through agencies uncontrolled by the wand of diplomacy, have opened new markets and thrown upon us new responsibilities. The centralization of capital and combining of large interests and plants made it apparent to those who held the guiding wands and controlled product and policy that extension of trade in both established centers and undeveloped markets alone could keep these enormous plants constantly employed, without which holders of the securities could expect no financial returns. Therefore a vast responsibility rested upon their shoulders as well as a vast field of achievement before them. Nor could these aggregations of capital and plants expect in the process of time to escape formidable competition, and, indeed, at this moment vast projects are being consummated and further projects are being discussed which in the uear future may equal all the combined interests of recent manipulations of Wire, Wire Nails, Tin Plate and other industries. When we reflect upon the activity confined within our own limits during the last year we must not overlook the fact that a Presidential year is usually looked upon as a year of hesitancy and uncertainty, and this was admittedly so for a couple of months during midsummer, but as the Presidential contest reached its zenith restored confidence asserted itself and a full blast of confidence was everywhere visible immediately after the contest was over. Depre-

ciated stocks enhanced in value, the bank clearings of the country rose to an extent known but once before in our history, and railroads were blocked with goods in transit, East, West, North and South, the railroad earnings having increased some 10 per cent. during the year.

The gigantic export figures of 1899 expanded into greater proportions during the year 1900, and the closing of the year shows gratifying figures and results never before equaled, indeed we might say never dreamed of other than in the wildest flights of imagination. The excess of exports over imports left in its trail a tremendous balance which must eventually bring a further supply of gold to add to the almost wonderful supply now held by our country. Foreign nations have called upon us for aid in placing bonds, and in this we not only showed a willingness but an ability to absorb them which necessitated our releasing gold from our overfilled vaults without inconvenience to ourselves. The rate of interest has fallen in our country so that Government bonds were quickly absorbed at a heretofore unknown low rate of interest, and municipal bonds of large cities have been quickly taken at 3 per cent. interest. While persons of small means depending largely upon incomes are startled at this transformation, the average traders as well as those who have incumbrances upon their farms can welcome the change with joy.

Taken as a whole the progress of the century has been phenomenal, and never before has the most sanguine optimist or enthusiast of our country's destinies pictured the closing results which ended in the ringing of thousands of bells and striking of millions of clocks at the hour of 12, December 31, 1900.

The wage earners of the country have certainly been benefited by trade expansion and home activities. There always have been, and probably will continue to be, jealousies creeping into industrial and mercantile life, but the last few years have dispelled the illusion of the old maxim that no two men in the same trade or business can agree. Rival interests and aggressive competition have doubtless made our country master of the situation, but time has tempered the bitter spirit and narrowness of the past and we no longer associate rivals with enemies or rascals. Then why should we not enter the new century with malice toward none and good will toward all ?

Notes on Prices.

Wire Nails.—The condition of the Wire Nail market remains unchanged. The trade have not been informed of any change in prices, and quotations remain as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

To jobbers in carload lots.....$2.20
To jobbers in less than carload lots..... 2.25
To retailers in carload lots..... 2.30
To retailers in less than carload lots..... 2.40

New York.—The local demand for Wire Nails is all that could be expected for the season. Prices are as follows:

To retailers, carloads on dock.....$2.48
Small lots at store..... 2.55

Chicago, by Telegraph.—The demand for Wire Nails has hardly slackened, even with the end of the year at hand. Very large orders were received by manufacturers during the week and shipments are probably as heavy as at any previous time in the history of the trade. Orders are steadily being booked for shipment at the earliest possible date. The local jobbing trade has been unusually good for the season. Quotations are maintained at $2.35 for carload lots, with the usual advance in small lots.

St. Louis.—The heavy demand for Wire Nails is still in evidence. In fact, mills' capacity is claimed to be congested, the statement not being a matter of hearsay, but deduced from the delay in shipments. Quotations to points in Texas, Oklahoma and Indian Territories are withdrawn, due, it is said, to possible changes in freight rates. At this writing no change has been made in prices of Nails. Price is $2.40, base, in carloads to retailers; $2.45, base, for smaller lots.

Pittsburgh.—Demand for Wire Nails shows a falling off, but is still fairly large, considering the lateness of the season. There are rumors of an advance in prices to be made about January 1, but nothing official has been given out. We quote, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

To jobbers in carload lots.....$2.20
To jobbers in less than carload lots..... 2.25
To retailers in carload lots..... 2.30
To retailers in less than carload lots..... 2.40

Cut Nails.—There is nothing of particular interest in the Cut Nail market. Prices are without change, while the demand is fair. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. off in 10 days:

Carload lots.....$1.95
To jobbers in less than carload lots..... 2.00
To retailers in less than carload lots..... 2.10

New York.—Cut Nails are in limited demand at this point. Prices remain unchanged, as follows:

To jobbers in carload lots on dock.....$2.13
To jobbers in less than carload lots on dock..... 2.18
To retailers in less than carload lots on dock..... 2.31
Small lots from store..... 2.25

Chicago, by Telegraph.—The trade in Cut Nails has kept up very well, corresponding with the excellent demand for Wire Nails. Small lots from stock are held at $2.25.

St. Louis.—Business in Cut Nails is confined to regular wants, no unusual orders being received. Price is $2.30 to $2.40, base.

Pittsburgh.—Orders for Cut Nails have fallen off a good deal, but are expected to increase after January 1. There has been no change in prices, and we quote, f.o.b. Pittsburgh, terms 60 days, 2 per cent. off in ten days, as follows: Carload lots, $1.95; jobbers, less than carload lots, $2.

Barb Wire.—A good demand for Barb Wire is experienced in some sections, and in others it is moderate. Indications point to an increased trade for spring. Quotations for domestic trade are as follows, f.o.b. Pittsburgh, net cash 60 days, or 2 per cent. discount for cash in ten days:

To jobbers in carload lots, Painted.....$2.50
To jobbers in carload lots, Galvanized..... 2.80
To jobbers in less than carload lots, Painted..... 2.55
To jobbers in less than carload lots, Galvanized.... 2.85
To retailers in carload lots, Painted..... 2.60
To retailers in carload lots, Galvanized..... 2.90
To retailers in less than carload lots, Painted..... 2.70
To retailers in less than carload lots, Galvanized... 3.00

Ellwood and Baker Wire is 5 cents and Washburn & Moen Glidden 10 cents per 100 higher than the foregoing prices.

Chicago, by Telegraph.—An excellent demand for Barb Wire is still reported by both manufacturers and jobbers. Surprisingly good orders have been received from large buyers by the manufacturers. The local jobbers had expected by this time to find business light, but on the contrary it keeps up well. Quotations are maintained at $2.70 for small lots of Painted and $3 for Galvanized Wire from stock, with the usual reduction on carload lots.

St. Louis.—The demand for Barb Wire is causing delay in shipments, the general conditions being similar to those prevailing in the supply and demand of Wire Nails. Painted in carloads to retailers is $2.70; smaller quantities, $2.75. Galvanized is 30 cents higher.

Pittsburgh.—There is a fair demand for Barb Wire, which will probably increase early in the year. Export trade continues large, and is increasing right along. For domestic trade we quote: Galvanized Barb Wire, $2.80, in carload lots to jobbers, and Painted, $2.50. Terms 60 days net, 2 per cent. discount for cash in ten days, f.o.b. Pittsburgh.

Plain Wire.—The demand for Plain Wire is somewhat larger than is usually expected at this season. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. off for cash in ten days:

	Base sizes. Plain.	Galv.
To jobbers in carload lots	$2.15	$2.55
To jobbers in less than carload lots	2.20	2.60
To retailers in carload lots	2.25	2.65
To retailers in less than carload lots	2.35	2.75

The above prices are for the base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the advances indicated in the following table:

Plain Fence Wire Advances (Catch Weights).

Nos.					Galvanized.
6 to 9	Base				$0.40 extra.
10	$0.05	advance	over	base	.40 "
11	.10	"	"	"	.40 "
12 and 12½	.15	"	"	"	.40 "
13	.25	"	"	"	.40 "
14	.35	"	"	"	.40 "
15	.45	"	"	"	.75 "
16	.55	"	"	"	.75 "
17	.70	"	"	"	1.00 "
18	.85	"	"	"	1.00 "

For even weight bundles, 50 pounds or over, 5 cents per bundle advance on above.

Chicago, by Telegraph.—Trade in Plain Wire shows but little falling off. Manufacturers and jobbers continue to report good business. Small lots, Chicago delivery, are selling at $2.35, base.

Pittsburgh.—There is a moderate demand for Plain Wire, larger than usual at this season of the year. We quote:

	Plain.
To jobbers in carload lots	$2.15
To jobbers in less than carload lots	2.20
To retailers in carload lots	2.25
To retailers in less than carload lots	2.35

Galvanized Wire up to No. 14 is 40 cents advance on Plain; Nos. 15 and 16, 75 cents advance, and Nos. 17 and 18, $1 advance. Terms are 60 days net, with 2 per cent. discount allowed for cash if paid in 10 days from date of invoice.

Shot.—Under date of December 31 the eastern manufacturers of Shot announce the following revised prices, net cash 30 days, or 2 per cent. discount for cash in 10 days, with the usual abatement for ton lots.

Drop Shot, sizes smaller than B, per 25-lb. bag	$1.35
Drop Shot, B and larger sizes	1.60
Buck Shot	1.60
Chilled Shot	1.60
Dust Shot	2.10

Eye Bolts.—The Billings & Spencer Company, Hartford, Conn., have adopted a new list on Drop Forged Eye Bolts, which has been issued, and takes effect under date January 1.

Stanley Rule & Level Company.—Under date January 1, 1901, Stanley Rule & Level Company, New Britain, Conn., issue a discount sheet relating to their extensive line of goods. The discounts named in it are the same as those announced by them a year ago. They call attention to the following changes which have been made in list prices of their Boxwood Rules and Stanley Planes, the printed discount on Boxwood Rules being 75 and 10 per cent., as before:

Boxwood Rules.

No. 4, list per dozen	$11.00
No. 12, list per dozen	16.00
No. 18, list per dozen	6.00
No. 26, list per dozen	11.00
No. 27, list per dozen	13.00
No. 29, list per dozen	4.50
No. 66, list per dozen	10.00
No. 66½, list per dozen	10.00
No. 67, list per dozen	6.00

Stanley Planes.

No. 100, each	$0.30
No. 130, each	.85

Glass.—The Independent Glass Company has been incorporated as the result of the attempt to form factories outside of the American Window Glass Company into an association. It is understood that all Glass produced by the members will become the property of the Independent Glass Company as soon as it enters the factory warehouse, being paid for at a rate which will probably represent the maximum cost of production. Matters relating to prices and marketing the product will be in charge of the company's headquarters, which, it is stated, will be at Pittsburgh, Pa. It is anticipated that there will be an agreement between the Independent and the American Company in regard to prices, and that an advance will be made. A list has been prepared by the American Window Glass Company, to date from January 1, 1901, with the view of having one discount cover the entire list. Until discounts are announced the list of January 1, 1898, will remain in force.

It is reported that the Independent Company have a new list in course of preparation. Jobbers' quotations remain as follows, pending the announcement of new discounts. For carload lots jobbers quote manufacturers' prices, with 5 per cent. added. Discounts for small lots from the jobbers' list of September 1, which are uniform over the entire country, are as follows:

All single strength	85 and 25 %
All double strength	85 and 25 and 5 %

Paints and Colors.—*Leads.*—The market for White Lead in Oil is without change, either in price or demand. The latter is very moderate. Quotations are as follows: In lots of 500 pounds and over, 6½ cents per pound; in lots of less than 500 pounds, 7 cents per pound.

Oils.—*Linseed Oil.*—Demand for Linseed Oil is small, both for present and future delivery. Large buyers are holding off for 50-cent Oil. The market is weak, and nominal quotations are as follows: City Raw, 60 cents per gallon; State and Western Raw, 55 cents.

Spirits Turpentine.—The local Turpentine market is dull on a declining market. Southerns are quoted at 38½ cents, and machine made barrels at 39 cents per gallon. Values in the Savannah market have been downward, owing to the larger receipt from interior points than was expected at this season.

Death of Frank Shapleigh.

AS we go to press telegraphic advices reach us that Frank Shapleigh, general manager of the A. F. Shapleigh Hardware Company, St. Louis, died on the 1st inst. after a brief illness. Mr. Shapleigh was born in Philadelphia in 1838 and since 1857 had been engaged in business in St. Louis. Mr. Shapleigh was of a quiet, kindly disposition, and was highly esteemed by all who knew him.

Wool Horse Blankets and Carriage Robes.

IN their advertisement on another page, the Beckman Company, Northern Ohio Blanket Mills, Cleveland, Ohio, call attention to their lines of Wool Square Horse Blankets and Wool Carriage Robes, emphasizing the fact that these goods are offered from the mill direct to the retail trade, and not through middlemen. The line is referred to as a profitable one for the Hardware trade and as "easy to sell as Nails." The company's catalogue indicates the extensive variety of these goods which are manufactured.

The Andrew B. Hendryx Company.

THE ANDREW B. HENDRYX COMPANY, New Haven, Conn., have issued a handsomely bound catalogue of more than 300 pages for 1901. The catalogue covers their varied manufactures, including Bird and Animal Cages and specialties, Chain, Wire Picture Cord, Fishing Tackle, Reels, &c. The catalogue is very attractively gotten up, and represents satisfactorily the interesting line of goods to which it is devoted.

Request for Catalogues, &c.

J. M. JACOBS & CO., Fairmont, W. Va., have disposed of their retail business to J. L. Hall, and will hereafter do an extensive wholesale trade under the firm name of the Jacobs & Hutchinson Hardware Company, and are in the market for a full line of Hardware. Catalogues and quotations are requested from manufacturers.

Hardware Organizations.

MICHIGAN RETAIL HARDWARE DEALERS' ASSOCIATION.

We are indebted to Fred. H. Cozzens, secretary of the Michigan Retail Hardware Dealers' Association, for the following account of its work in 1900:

Responding to your request for a statement of the condition of the Michigan Retail Hardware Dealers' Association I take pleasure in presenting the same herewith in as concise a form as possible.

A year ago to-day we had on our books 139 full paid members. Our membership at that time was supposed to be between 300 and 400, and in fact we had that number on our books, some of whom I regret to state were two, three, four and even five years in arrears with their dues.

A Personal Organizer and What He Accomplished.

Shortly after January 1, 1900, I obtained the consent of our Executive Committee to start a personal organizer to call on the members of the Hardware fraternity in this State and present the claims of our association for their support and to enlist new members. The reason this was not done prior to January 1 was the fact that our dues are not payable till then, and we find that after the convention members do not like to come in and pay one year's dues for a half year's membership, and it is not profitable for a solicitor to work at less than the $3 initiation fee provided by our constitution and by-laws, to which is now added the $1 membership fee in the Interstate Association. Consequently between our convention in July and January 1 there is usually very little done in the way of securing new members, although we occasionally have some come in by mail.

This organizer gave his entire time to the matter, though in fact he did not actually get to work until about the middle of March. From March 15 until June 15, three months, this personal representative of the Michigan Retail Hardware Association visited 120 towns in the interest of our organization. To do this he traveled about 3000 miles, making an average of 25 calls a week. He succeeded in 82 of the towns he visited in obtaining a membership of about one in every three called upon. By this means 109 new members were added during the three months he was out. The subscription agent of *Trade* secured 28 members during the year and eight came in by mail. Thus from January 1, 1900, to July 1, 1900, the Michigan Retail Hardware Dealers' Association gained 145 new members.

Present Strength of the Association.

During the year ending July 1 last we lost four members, two through withdrawals and two because the firms went out of business. That left a total net paid membership of 280 at the beginning of our convention. Nineteen joined during the convention, making 299 members at that time. A few who were not at the convention failed to pay their $1 Interstate dues, even though they had paid their Michigan Hardware dues at that time, and, as one of our rules is that no member can be regarded as an active factor in our organization unless his Interstate dues are paid as well as his State dues, our membership is probably very close to 290 active, full paid State and Interstate members at the present time, some six or eight having joined by mail since the last convention.

We Are Making Arrangements

to send a man out through the State about February 1, and expect to put on from 100 to 200 new members between now and next August, when our convention will be held.

The Michigan Retail Hardware Dealers' Association, I am pleased to say, has gone through the year with a balance, though a small one, in the treasury and all our obligations paid, the first time, I believe, that the organization has kept its head above water for the entire calendar year, at least since I have had any knowledge of it.

Remedying Abuses by Jobbers and Manufacturers.

During the past year we have achieved some notable triumphs in the way of remedying abuses of trade ethics in this State. Some of the questions involved were intricate and were acceded to by jobbers only after a voluminous correspondence and in some cases a personal interview with both the complainant and the party complained against, but there is not at present an unsettled complaint of any consequence on our books.

To accomplish this it has been necessary to write hundreds of letters and, as indicated above, sometimes to take the train and make a personal investigation into the merits of the case. A great many complaints are filed with our organization which are unjust; that is to say, which originate through a mistaken idea of the rights of the complainant, or, as is sometimes the case, through personal bias and a desire to "get even" with some one against whom he has a real or fancied grievance. It is necessary to deal with such cases with considerable tact and yet we make it a rule, if possible, never to let an unjust complaint go through this office, believing that it is better to have several guilty ones escape than to have one innocent manufacturer or jobber suffer. Be it said to the credit of the jobbers and manufacturers with whom we have taken up these matters, that almost invariably have they shown an entire willingness to coincide with our requests, which, as stated above, we have endeavored to have always reasonable, and that, with possibly one or two exceptions, they have religiously lived up to any agreements made with us.

I have in mind at present one notable case of bad faith, which, unless a change is made in the near future, is going to lose the party in question the good will and a large share of the trade of the Hardware dealers in this vicinity.

No manufacturer or jobber can afford to treat the requests of an organization such as the Michigan Retail Hardware Dealers' Association with bad faith, for there is nothing that the average man resents so quickly, whatever his own course would have been under the circumstances, as a man who says one thing and does another.

Five Hundred Members.

We hope to go into our annual convention with at least 500 active, full paid, interested members, which will be about one-half of the legitimate Hardware dealers in this State.

Influence of the Interstate Association.

One of the strongest factors in securing membership now is the active participation which the Interstate Association has taken in the affairs of the retail Hardware dealer, our thoughtful members fully realizing that just in proportion as the membership of the Interstate increases, so it is able to take up and carry through any measures of reform which are decided upon.

In association work of this kind it is frequently necessary for one or a few men to make great sacrifices in order that the work may be carried on, and there is sometimes a good deal of feeling by those actively engaged in the work against this fact. I believe that this arises more from the lack of a full understanding of the situation on the part of the average dealer than from any willingness or desire to unload the work on the shoulders of a few.

The average business man of to-day is so thoroughly immersed in his own affairs that wrongly, I believe, but truly, it is difficult for him to give sufficient thought to the broader and more important phases of commercial life, which in the end really have more to do with a satisfactory balance on the right side of the ledger than he imagines. Our hope in this particular is the free use of the columns of the leading trade papers of the land, which thus far have been so generously placed at our disposal by periodicals of great influence like *The Iron Age* and others, whereby the status of the work is disseminated and brought home to the individual dealer in a forcible manner.

Being interested in the publishing business myself, I realize the enormous power of printers' ink properly distributed, and I think that the retail dealers of the land owe a debt of infinite gratitude to *The Iron Age* or other

Hardware trade papers which have thus freely used their influence to the furtherance of these ends.

Organization a Solution of the Retailers' Difficulties.

To conclude, we believe that the Michigan Retail Hardware Dealers' Association is on a sound and permanent basis and that intelligently directed it offers a reasonable and satisfactory solution of many of the annoying and even distressing difficulties which concern the average regular Hardware dealer of to-day.

Concentration and organization seem to be the key words of twentieth century business methods, and, while the retail merchant has been among the last to realize this fact and to take it up vigorously, the enormous growth of such organizations as the Interstate Retail Hardware Dealers' Association, the National Association of Retail Grocers, the National Association of Retail Druggists and other similar mercantile organizations is the best evidence of the fact that the retail dealer is going to make up in speed what he has lost in starting.

Personally, I believe that such organizations as ours can be made of incalculable benefit not only to the retailer but to the manufacturer and jobber as well, as the social intercourse which members have with one another at their meetings and the interchange of ideas and methods which can be secured in no other way makes better merchants of them, keeps them abreast of the times and enables them to ascertain and adopt the latest and best plans for the conduct of their business, thereby directly benefiting all concerned in their particular line of trade.

Delinquents Will be Dropped.

I might add that on January 15 a statement of dues will be sent to every member of the Michigan Retail Hardware Dealers' Association and he will be notified that he owes $4 to the State treasury. In accordance with the resolution unanimously adopted at our last convention, all those who are not paid up by February 1 will be stricken from our membership rolls, as we find from experience that only those members who pay their dues promptly are of any value to the organization. We do not expect to lose a dozen members out of the whole lot, and I believe that the prompt collection of dues is one of the most vital means of keeping any organization alive and in active operation.

NORTH DAKOTA RETAIL HARDWARE ASSOCIATION.

The following review of association work during the year has been furnished by C. N. Barnes, the secretary of the organization:

In regard to association work in our State, I am pleased to report that there has never been a time since our organization that we did not move onward. If for any cause a member desired to drop out or went out of business, there has always been another to fill his place; every year our membership has increased, this year being no exception to others. During the past ten months we have added 23 new members, and feel confident before our next annual meeting that number will be doubled.

North Dakota, as you probably realize, is not very densely populated. There are in the entire State only 213 Hardware dealers; of this number we have 125 in our association in good standing, making, as you see, about 60 per cent. of all Hardware firms with us.

Our work during the past year has been very similar to previous ones. We endeavor to make our members feel that there is now a chance offered them to present their grievances, and, on the other hand, the same channel is offered to those whom we do our trading with, and by having this association it permits many matters from both sides to come before us for adjustment, and I am very much pleased to say that during the past ten months we have not had a question arise or a grievance filed but it has been satisfactorily adjusted.

Advantageous Fire Insurance.

One of the advantages our members have had during the past year is that dealers not in the association have been deprived of the opportunity of procuring a good, reliable protection in the line of fire insurance at a very much less cost than from old line companies. This insurance is available from the Hardware Dealers' Mutual Fire Insurance Company of Minnesota. It is operated under the laws of that State and managed and officered by the leading and most successful Hardware dealers in that State. Our members have sustained two losses by fire during the past ten months, and in each case the adjustment was made promptly.

Our association has great confidence in the good to be derived through the Interstate Association, and hope there may be many new State organizations formed to increase its usefulness.

The Next Annual Meeting.

Plans for the future will, of course, be taken up at our next meeting, which is to be held in Grand Forks, February 20 and 21. We anticipate a good gathering and I know personally that association meetings cannot help but prove profitable to all who attend. In a letter received to-day from one of our members, who joined at our last meeting, he said he would sooner pay $50 than be compelled to stay away from the coming meeting.

WISCONSIN RETAIL HARDWARE ASSOCIATION.

The fifth annual convention of our association will be held in Milwaukee February 6 and 7, and everything points to a very attractive and interesting meeting. The net gain in membership since the last annual gathering is 17, giving us at this time 297 members in good standing, with all dues paid. A growing interest in the work of the association is manifested by the members generally. The official programme of the coming meeting is now in the printer's hands and will be ready for mailing about January 10.

PACIFIC RETAIL HARDWARE ASSOCIATION.

Robert W. Boyd, who is the secretary of the Pacific Retail Hardware Association, has furnished us the following synopsis of the work of the association during the past 12 months:

I have pleasure in making you a little synopsis of the proceedings and efforts of this association for the year just passed, presenting the conditions now existing. You will note that they differ somewhat from the conditions which present themselves to those who retail goods near the large manufacturing centers.

In the earlier days California importers and jobbers did at the same time a large retail trade, selling direct to the miners and farmers, and the competition among them produced results whereby they could not sell to the interior trade at very much less than to the individuals who presented themselves at their stores as retail customers. This condition necessitated retail clerks and other expenses in various ways, but through the efforts of our association the line has been drawn between the retailer and the importing jobber.

Instead of the retailer importing his staples and often overstocking himself, he can now buy from the importer in moderate quantities and at fair prices, turning over his stock more frequently and, in the end, making more profit, and the protection afforded him by the importer's withdrawing virtually from the retail trade creates a feeling of reciprocity which benefits all.

Then again the annual conventions of retailers bring the members together. They become better acquainted woth each other and come to mutual understandings regarding local retail prices, which is beneficial and restrains the idea of selling leading staples which have no individuality, such as Bar Iron, Steel, Rope, Nails, Barbed Wire, &c., without a fair and reasonable profit, and in case of local misunderstandings the Executive Committee is always in a position to arbitrate, which is generally accepted by all.

The retailers can now always count on the assistance and support of the importers to aid them in the little difficulties which arise from time to time with the transportation companies and others, and generally work together toward a better understanding regarding the invasion of our local retail markets by the catalogue houses of the Middle West.

The membership of this association is at present 75, being an increase of 18 in the past 12 months, and while it embraces nearly every retailer north of Sacramento, yet we hope that in the near future those south of that point will see the good results of our work and will affiliate with us, as indications all point in that direction. Our third annual meeting will be held in Woodland, Cal., January 16 and 17.

NEW ENGLAND HARDWARE DEALERS' ASSOCIATION.

We are indebted to George W. Burditt, president of the New England Hardware Dealers' Association, for the following statement in regard to its work in the past year:

We commenced the year with the hope of inducing dealers in the cities and larger towns to form local associations to be represented by delegates in our association, requesting them to bring before the association any questions of interest to the trade. The plan so far has not proved as successful as we could have wished, owing to the strong local competition found in many places. This lack of interest, we think, could be overcome by sending a few good speakers to such places who could set forth the advantages of association work.

Our meetings have been well attended, but not enough time has been given to discussion of trade topics and new methods of business, which should be our main thought.

I firmly believe in trade associations, and it should be impossible for any number of men to meet in a business way without some profit to each other. The association will be just what the members make it. The mere fact of meeting in a social way is a great improvement over the old plan, but sociability and business can travel together and be made a success. We have some points of dispute with manufacturers in our line, but none but which I believe will be adjusted with satisfaction to each party.

Early in the year invitations were sent to the manufacturers of New England to be present by a representative at any of our meetings. Many have responded to the invitation and have been gladly received, and we feel that the acquaintance has been a mutual benefit.

OREGON AND WASHINGTON HARDWARE ASSOCIATION.

At a recent meeting of this association the conclusion was reached that owing to conditions that it would be hard to overcome it was inexpedient to maintain a State organization at the present time. The difficulties referred to are the small population and long distances between towns, making the expense of getting together entirely out of proportion to the advantages to be gained. It was decided, however, to continue a Portland City organization, which is now in very effective operation.

INDIANA RETAIL HARDWARE DEALERS' ASSOCIATION.

For the following advices in regard to the Indiana Retail Hardware Dealers' Association we are indebted to M. L. Corey, secretary:

The Indiana Retail Hardware Dealers' Association will hold their next meeting in Indianapolis, February 19 and 20, with headquarters at the Grand Hotel.

A good programme has been arranged, reduced hotel and railroad rates secured, and all who are not members and expect to attend should write the secretary at once.

Many requests for constitution and by-laws and blank applications are being received, and 40 new members have been added within as many days.

The more progressive, prosperous and intelligent dealers are beginning to see the benefit of uniting upon questions affecting all more or less alike. Also the importance at this time of adding their influence to a movement that promises a much more satisfactory condition of trade than now exists.

Some dealers imagine because they do not see many results of our association work published in the trade papers that nothing is being done, not stopping to think that much of our work is accomplished through committees and in closed sessions and cannot be made public.

The Interstate Association is an important move in the right direction, and if properly supported by all organized States will become the medium by which nearly all matters affecting the retail Hardware trade in general may be satisfactorily settled, leaving local troubles for the State Association to handle.

Dinner of the Smith & Hemenway Company.

THE SMITH & HEMENWAY COMPANY, 296 Broadway, following the custom begun a year ago, entertained their employees at dinner in the main dining room of the Hardware Club, Saturday evening, December 29. Covers were laid for 47, a few of the guests, however, being unavoidably absent. Among those present were the wives of some of the married men of the force. After a fine dinner the toastmaster, W. Pierrepont White, president of the Utica Drop Forge & Tool Company, and it may be said, admirably qualified for such an exacting duty, called on a number of those present for short addresses, the responses in main being of a practical character and in the form of heart to heart talks on matters of interest to all. The company dispersed at midnight. In this connection a sketch of this young and energetic business house may be of interest.

Landon P. Smith, president of the Smith & Hemenway Company, is a native of Tennessee, educated in the Hardware business in Memphis and afterward in St. Louis with one of the best known jobbing houses. Coming East in 1895 he formed the firm of Smith, Herlitz & Co., who imported Hardware Specialties, the business being continued under that name for a year. Then the business was reorganized and a new partnership established under the name of Smith & Patterson, which lasted two years. Early in 1898 an incorporated company on broader lines was formed under the title of Smith & Hemenway Company, with J. F. Hemenway as secretary and treasurer. Mr. Hemenway's earlier experience was as manager and treasurer of the Empire Wringer Company, Auburn, N. Y., and later as assistant general manager and assistant treasurer of the American Wringer Company. For about a year they remained at 10 Warren street, New York, but requiring more room for their growing business they moved to larger and more commodious quarters at 20 Warren street. At the expiration of another year these quarters became inadequate, so they moved to 296 Broadway, where they now are, obtaining more room and increased facilities for the conduct of their enlarged trade.

Smith & Hemenway Company succeeded to the business of the following concerns: Smith & Patterson, the Hardware business of Maltby-Henley Company, Bindley Automatic Wrench Company, Anderberg Importing Company, and John Byrnes, manufacturer of Glass Cutters, all of New York. Soon after their organization as the Smith & Hemenway Company they associated themselves with the Utica Drop Forge & Tool Company, Utica, N. Y., who succeeded the Interchangeable Tool Company and Russell Hardware & Implement Mfg. Company. Their New York office is with the Smith & Hemenway Company, where catalogues and quotations can be obtained. The Utica Drop Forge & Tool Company manufacture an exceedingly large and diverse line of high grade cutting Nippers and Pliers in a great variety of styles and sizes.

The Smith & Hemenway Company have also recently organized the Schatz Hardware Mfg. Company, Mt. Carmel, Conn., for the manufacture of Nail Pullers and Hardware specialties. In the fall of 1899 the Smith & Hemenway Company associated themselves with Thomson Bros. & Co., Lowell, Mass., manufacturers of the Seavey miter box, an improved form of which has just been put on the market.

Trade Items.

THE CHICAGO RETAIL HARDWARE ASSOCIATION announce their eighth annual reception and ball on Wednesday evening, January 16. It will be given at Schoenhofen's Hall, Milwaukee and Ashland avenues, Chicago.

ON another page will be observed the advertisement of the Rippley Hardware Company, Grafton, Ill., directing attention to their line of Feed Cookers for farmers' use. This Cooker is described as built like a steam boiler, and for this reason particularly strong and durable. It can be used not only to cook feed, it is stated, but also to heat water and buildings at a considerable distance. The company will be pleased to send catalogue and quotations on application.

THE LLOYD MFG. COMPANY of Minneapolis, Minn., and the Lloyd Mfg. Company, Limited of Sowerby Bridge, England, manufacturers of Wire Specialties, have made H. P. Richardson secretary of their company. Frank A. Umsted has become the general manager and F. H. Stedman the general sales agent. All of these parties have until recently been connected with the Hartman Mfg. Company of Ellwood City, Pa. Mr. Richardson's connection with the latter company covers a period of nearly 13 years, he having served in various capacities and finally as general manager. Mr. Ulmsted was the general sales manager of the Hartman Mfg. Company and Mr. Stedman was employed by them as traveling salesman for some two years. An Eastern sales office under the management of these gentlemen will be opened in New York City.

WARNER & RUCKER, 88 Chambers street, New York, agents for the Rogers Screw Company, Providence, R. I., have swung in front of their place of business a unique sign. It is an exact enlarged duplicate in every way of a Screw label, such as is put on a gross box of 1¼ x 10 inch, flat head bright Wood Screws. The sign is 30 x 18 inches, and the same on both sides, duplicating even the color of the label and the black rules around the edges.

JOHN M. THOMPSON, who for nearly a quarter of a century has served the Simmons Hardware Company of St. Louis as a traveling representative, was, at the severance of his connection with this widely known house, presented with a massive gold watch, a gift from the travelers representing the company in the Northwest. The watch is of beautiful design, highly embellished with Masonic emblems of the Blue Lodge Chapter, Commandery, Consistory and Shrine, of most of which bodies Mr. Thompson is a life member. For 26 years Mr. Thompson has been a constant caller upon the Hardware trade of the Northwest, among whom he has a host of friends. The presentation took place at Mr. Thompson's home at 214 East Sixteenth street, Minneapolis.

THE CRAWFORDSVILLE WIRE & NAIL COMPANY, Crawfordsville, Ind., have been incorporated with a capital of $50,000 to manufacture Barb Wire, Woven Wire Fencing, Nails, Steel, Ties, &c. The directors are J. A. Detchan, C. D. Voris, W. P. Herron, H. H. Ristine, P. C. Somerville, H. E. Greene and Benjamin Crane. The company will put up a mill for drawing their own Wire. Buildings have been secured for the plant, and additions will be built as soon as possible. Many of the present stockholders are men who held large amounts of stock in the old Indiana Wire Fence Company.

NEAL & BRINKER, 18 Warren street, New York, have recently been appointed the Eastern and export agents for the John C. Jewett Mfg. Company, Buffalo, N. Y. This company, whose business was established in 1849, are large manufacturers of Refrigerators and Ice Chests. A feature of their catalogue just issued, containing 62 pages of this line of goods, is an assortment of genuine tile lined Refrigerators in family sizes, which are offered at moderate prices.

IN this issue will be found a page advertisement of the Arcade File Works, Anderson, Ind., 97 Chambers street, New York, in which, as an earnest of their unqualified guarantee, they offer to send to any responsible dealer "a dozen Arcade Files to become the property of the receiver or return at the manufacturer's expense if the guanantee is not fully borne out in every particular."

IN their advertisement in this issue Russell & Erwin Mfg. Company, New Britain, Conn., and New York, allude to the length of time in which they have been in business—a period of 62 years, which gives them place among the pioneer Hardware manufacturers. An additional point of interest to which no reference is made is the fact that January 1 just passed was the fiftieth anniversary of their existence as an incorporated company. They are thus one of the oldest Hardware manufacturing corporations of the country.

WRIGHT SHOVEL COMPANY, Anderson, Ind., for whom A. G. Sherman is Eastern representative at 14 Warren street, New York, are calling special attention to their Imperial improved solid shank goods in Long and D Handle, Round and Square Point Shovels and Spades, Post, Drain and Ditching Spades, and Molders' Shovels. These goods are referred to as made from the best crucible Shovel steel, the handles being of the best selected second growth white ash. The Imperial Shovels and Spades are neatly crated, one-half dozen in a crate.

FRIENDS and customers of the S. Obermayer Company, manufacturers of Foundry Supplies and Equipment, Cincinnati, Ohio, have received from that concern a letter inclosing a unique bill of lading, which relates to a shipment of an assorted car of the company's "Good Wishes, Prosperity and Happiness." The bill of lading is all regularly made out, shipment is made by the "Twentieth Century Transportation Company," the marks being "1901." The car number is 4-11-44, and the number of packages "unlimited." "All charges have been prepaid," says the letter accompanying the bill of lading, and "although we have no regular requisition from you for this car, yet we feel confident that its contents will prove very acceptable, and, trusting we have sent you sufficient to last you until 1902, we remain, with New Year's greeting, very cordially yours."

THE many friends of Charles Boebinger, president of the Boebinger Hardware Company, Cincinnati, Ohio, will regret to learn of his death by accident on the evening of December 21. Mr. Boebinger was in his fortieth year, a member in high standing among Masonic circles and esteemed by all who had the pleasure of his acquaintance. He was the moving spirit in the business of which he was the head, and enjoyed a wide acquaintance among the Hardware trade.

Calendars, &c.

CARY MFG. COMPANY, 19 and 21 Roosevelt street, New York, manufacturers of Box Straps, Fasteners, Clasps and Shippers' Specialties: Hanger calendar which will be sent on application.

HESS, SNYDER & CO., Massillon, Ohio, manufacturers of Furnaces, Ranges, Stoves, Friction Clutch Pulleys, Force and Spray Pumps, &c.

STUDEBAKER BROS. MFG. COMPANY, South Bend, Ind.: The Studebaker Farmers' Almanac for 1901.

JOHNSTON HARVESTER COMPANY, Batavia, N. Y.: Large pictorial hanger showing their machines at work in different parts of the world.

C. H. CASEY, Jordan, Minn., dealer in Hardware and Farm Machinery.

W. H. GOODFELLOW & SON, Hardware and Stove merchants, with stores at Altoona and Hollidaysburg, Pa.

THEODORE HOFELLER & CO., dealers in Old Rubber, Rags, Paper Stock and Metals, 98 to 102 Terrace, Buffalo, N. Y.: Diary for 1901.

ROBERT DONAHUE IRON & HARDWARE COMPANY, Burlington, Iowa, jobbers of Hardware, &c.

A. B. WARE, Opelika, Ala., dealer in Hardware, Stoves, &c.

PH. WEIGEL, JR., New Brunswick, N. J., dealer in Hardware, Iron and Steel, &c.

UNION METALLIC CARTRIDGE COMPANY, 313 Broadway New York, manufacturers of Ammunition.

ROBINSON & FOX, 35 Warren street, New York, exporters.

What Hardware Merchants Say About Trade in 1900.

In reply to inquiries addressed to representative Hardware merchants throughout the country, we have received a large number of letters, from which the following extracts are taken. They refer to the general character of the business of 1900, and allude to changes which have taken place in trade methods, and especially the difficulties confronting retail merchants. The letters are a valuable part of the review of the year, reflecting accurately existing conditions, and indicating the way in which many questions of current interest are regarded by representative and progressive Hardwaremen:

North Carolina.

Business has been very good during this year. The farmers have made money and are paying up very well.

Cannot say very much about the outlook for 1901. Most of the cotton has been sold, and our business depends considerably upon the cotton crop. The crop this year in North Carolina has perhaps been better per acreage than most of the Southern States and the average price paid was about 9 cents per pound, several cents per pound more than the average year by year. It is feared that next year the farmer will neglect other crops and plant too large an acreage in cotton throughout the South, inducing overproduction and bringing the price down very much.

Pennsylvania.

Business in this locality has not shown the same improvement as the two previous years. We put it this way as we expect each year to show an improvement, and while our sales will reach about the same figures, our profits will not. That our sales have not shown the expected increase may be attributed to the extremely dry season, scant dairy products and short crops in many localities.

In the early part of the season building was at a standstill and some lines of farm supplies dragged, in consequence of efforts of manufacturers and jobbers to maintain prices that were beyond reason. Our community are, generally speaking, prosperous. That retailers have not realized their usual profits is the natural consequence of honest efforts to treat patrons fairly, while compelled to pay boom prices for many familiar goods. With common sense in regard to prices, and usual results in our farming sections, we consider the outlook flattering.

Unreasonably High Prices.

New Jersey.

I find that the Christmas trade here in this city has been a great deal better than I expected and the outlook for 1901 is certainly excellent, and no doubt it will be an A No. 1 year in the Hardware business.

Michigan.

Business with us the past year has been very satisfactory. It will show an increase of about 25 per cent. over 1899. This is a manufacturing town exclusively, and everything is running with full force, and we anticipate a continuance of same for 1901.

Situated as we are, so close to Detroit, we experience the greatest trouble from the department stores there.

Georgia.

Our business this year has been 25 per cent. better than it was last year.

All of the farmers in this section are in a prosperous condition. The principal hindrance to our success as retailers is catalogues from the large department stores. The business outlook for 1901 is good.

New York.

Taking into consideration the very severe drought we had during last summer, the past year compares very favorably with previous years. Our town being a "farming town" its prosperity depends on the prosperity of the farmers. The outlook for 1901 is good, and will continue so with good outlook for crops.

Wisconsin.

The year just past has been, I think, in this section as good as the preceding ones, except possibly 1899, which we might say was exceptional.

We are in a farming community, and they seem, as a class, to feel that the past has been a good year to them; this, of course, does not include that small class who would like to sell their wheat at $2 and buy their Nails at 75 cents, and I think even then would complain of some other commodity.

To my mind the principal obstacle to the retailer's success is a lack of appreciation of the necessity to do what he does in the very best possible way. Drop all slack methods, and bring everything to a businesslike basis. Fight the department stores in their own towns with their own methods. I see no reason why 1901 should not be a good year in this section.

No Slack Methods.

Pennsylvania.

The year 1900 with me has been the most prosperous in my experience. The prosperity in our commuity is very noticeable and encouraging, factories running full time and more men being employed than for years.

The outlook for 1901 is very encouraging.

Indiana.

Our trade is far better than the previous year, and think profits are better in all lines of Hardware and Implements.

Our customers feel as though prices were established to a certain extent and feel confident that the decision of the people in November was the right and only one to make.

Catalogue houses in Chicago, with whose methods you are well acquainted, are the most serious difficulty we have to contend with, but associations, local and State, will surely head them off.

We can see no reason for anything but a bright outlook for the coming year.

Overcoming the Catalogue House Evil.

New York.

The present year shows a decided improvement over previous years, and our farmers, as a rule, have done well, and good times are here once more. The only hindrances we have are the catalogue houses and wholesalers (?) who sell at retail. The outlook for 1901 is exceedingly good.

Retailing Wholesalers.

Pennsylvania.

I have had a very fair year, and have no reason to complain. The volume of sales is not quite up to 1899. Of course, there has been some depreciation in value, but if I never have any worse year than 1900 I will not have any reason to complain.

The prosperity in our community is largely dependent upon the price of crude petroleum, which experienced quite a decline from about April 1 to September 1, at which point it stopped, and it is thought it has reached bottom. Labor is well employed, and no good man need go without a job, if he is willing to work.

The principal hindrance to the retailer's success is soliciting the factory and mill trade by the jobber. Some jobbing houses send two men in this district, one to solicit the retailer's trade, the other to solicit the mill trade, but this is an old story as well as a long one.

I consider my prospects for 1901 good, and sincerely hope that the manufacturers will not advance prices as they did in 1899.

Jobbers Selling to Consumers.

Massachusetts.

We have come nearly to the close of 1900 with the largest sales our house has ever enjoyed, both in tonnage and in dollars. The opening of the year did not promise such a result, as building operations seemed to be at a standstill, owing to the demands of the strong labor union, but the increased trade from the prosperous farmers and the activity of such of our manufacturers as are engaged in the paper, cotton and metal industries has brought the total to the above satisfactory result.

Our woolen factories have been running on short time and with reduced pay rolls, but, on the whole, there is a fair degree of prosperity and a hopeful feeling for the future in this community. The employees of our large mills seem to have money, and the holiday season just closing has seen them in flocks on our streets with full arms and smiling faces.

The farmers have been blessed with abundant crops, which they have disposed of at good prices. The attractiveness of these Berkshire hills has brought more and more summer visitors among us, and they are a source of large and increasing revenues, both to the merchants and to the laboring people whom they employ in large numbers.

Increased Cost of Doing Business.

The growth of association work has brought about a less strenuous competition, and the "only fly in the ointment," is the increased cost of doing business. It is so much easier to make money than to keep it. The ratio of expense to total profits we do not seem able to keep down. Every item of store expense is growing—light, heat, pay roll, cartage, postage, stationery, repairs—all seem to demand an increase, and it is hustle all the time to bring the sales up to the point where they should be to meet these demands.

This takes time and attention, to the exclusion of that necessary recreation which makes life worth living, and makes us stop occasionally and ask, Is the Hardware business a failure?

New York.

Our trade has been better and collections about the same.

Our town is very prosperous at present and the indications point to plenty of business for 1901. We never have booms, but just about so much trade comes each year.

Importance of Steady Prices.

The outlook for next year was never better. Let prices remain steady and we will do the rest.

Ohio.

We are pleased to say that our volume of business was greater the first half of the year than any other year previously. As a matter of fact, most retail Hardware dealers prepare for a falling off toward the close of the year, but our trade has kept up better than had been anticipated.

We have been making a special effort for Christmas trade, and the result of our efforts is gratifying.

A Splendid Holiday Trade.

The degree of prosperity in our community is excellent, our factories are all overcrowded with orders and the farmers seem to be in a prosperous condition.

One of the vital hindrances to the retailer's success is the manufacturers selling their products direct to the consumer. We think the outlook for 1901 is very flattering.

Connecticut.

The past year has been with us a fair average year. We could hardly expect that the volume of business with us would reach the figures that it did the year previous, owing to the fact that that year was a phenomenal one in many respects, and the same conditions that existed during that year with us will not be likely to exist again for many years to come; but on the whole the year has been a satisfactory one. Our factories in this locality have all been full of business, and there are no idle people in our vicinity who wish to work.

With reference to obstacles to the retailer's success, would say that the conditions here are probably identical with those elsewhere. The cutting of prices is always a factor that has to be taken into account. We are engaged largely in a mill supply jobbing trade, selling very largely to the manufacturers in our vicinity. We encounter the same trouble that others in like business have to meet. The tendency of the manufacturer to sell direct to the large consumer at an extreme price is a very disagreeable factor. While this does not apply to all lines it is, however, pretty general. The late action of the Machine Screw manufacturers in this particular is an especially discouraging feature to the jobber and to others who are doing a similar business to our own. At one of their late meetings they voted to sell direct to the large consumer at the same line of discounts that they give to the jobber. This offers very little inducement to the jobber to carry their stocks.

Retailer's Obstacles.

With reference to the outlook for 1901, as far as we can predict, from local signs, it is certainly very promising. Many of our large factories are enlarging and increasing their capacity for production, which of course means the employment of more men and the purchase of further supplies. Taking it as a whole, the situation appears to us as one of considerable promise for the coming few years.

Pennsylvania.

The business of 1900 is about 10 per cent. better than previous years. Northwestern Pennsylvania is prospering at present, business being especially good here.

Hardwaremen in a Rut.

The hindrances to success of the retailer are the department stores, the rut into which the Hardware trade seems to have fallen, and its failure to use progressive business methods in advertising, &c.

The outlook for 1901 is very good indeed.

Wisconsin.

This year's business has been about 15 per cent. less than last year. Out community is apparently prosperous; plenty of work for every one that can and wants to work.

We are handicapped here by being only a few miles from Milwaukee, with good electric car service, which takes a good share of our local trade to town in spite of any prices made. I think the outlook for next year is very good for our little city.

Indiana.

The past year compares very favorably with previous years as regards general volume of miscellaneous trade; in fact, has been ahead of any previous year, considering amount of goods which we think has gone into the consumers' hands. The people in our immediate vicinity seem to be prosperous and all seem to have money in their pockets.

We think that the principal hindrance to the retailer's success is the great amount of selling which is done direct by manufacturers and jobbers to parties who are not deserving of the low prices that are made to them. We refer to such people as factories, blacksmiths, &c. We are bothered more by this class of quotations than we are by the department stores and mail order people.

Competition of Jobbers and Manufacturers.

The mail order houses are annoying us less and less, and the department stores occupy a place from which we do not think they can be dislodged and which we figure upon their occupying, and we do not believe they will ever cut a larger figure with our trade than they do at present. We are not afraid of either department stores or catalogue houses any longer. They have taken from us, we think, all the trade that they possibly can. If there is any change, so far as their competition is concerned, we think it will be for the better rather than the worse.

But we do not think that it is in accordance with the best business ethics for manufacturers to sell goods, or any supplies or tools of any kind, to the factories and small consumers, such as blacksmiths, &c., at the same price, or as they sometimes do, at even better prices than

they will sell to the large retail Hardware concerns. To this we object more than anything else when questioned as to the evils menacing the Hardware retailer's trade.

The outlook for 1901 is as good as it could possibly be wished for by a reasonable man. We believe Hardware men will make money in 1901.

Pennsylvania.

The year 1900 has been an exceedingly prosperous one as compared with previous years, being by far the busiest in my line. While the profits are not large, yet there is a fair margin, and it would be larger were it not for the small dealer, who does nearly all the work himself and has no expense. This of course is a hindrance to fair profits, but upon the whole trade has been very satisfactory, and the prospects for the coming season are very good, in our locality especially so. If the markets do not become too unsettled I think the outlook very favorable. We have two concerns now that are getting ready to get into operation, which means employment for several hundred men, and this of course means the distribution of more money. Then, again, we are short in small houses, and if this demand continues it will compel the erection of more small houses. This again means the occupying of ground which heretofore has been unsalable on account of not being desirably located for higher class houses.

We are of course very much hampered in the retail business by our proximity to Philadelphia, which is a very great disadvantage. We are quite frequently compelled to meet the prices of Philadelphia stores, and this is almost impossible to do, as the volume of business we do is not large enough to reduce the cost of doing business to low enough a figure. This, I think, is the greatest hindrance to the retailer in our locality, and I have no doubt is the same in all towns close to large cities.

Eradicating Irresponsible Concerns.

In my opinion, could we rid the community of all cheap and irresponsible concerns, whether in the Hardware or any other line of business, the business community at large would be very greatly benefited. In our town today you can hardly walk half a square but what you run up against establishments just of this kind, and they are apparently selling goods at prices at which good quality goods cannot be sold at a legitimate profit.

North Carolina.

The year just closed with us presents the largest volume of sales in our history. As far as we can judge conditions are prosperous in our community. The outlook for 1901 is encouraging, and we expect to do a gratifying amount of business.

Lack of Harmony and Confidence.

In regard to the principal hindrances to the retailer's success, we will not attempt to go into many of them, as you will no doubt have free expressions in this line. We do wish, however, to touch on one point, and that is the lack of unity of action and confidence in each other which seems to exist among retailers. There is no reason why the retailers should not act in accord in regard to maintenance of prices the same as jobbers. The retailer is not in a position to very materially increase the market on which he puts out his goods, so that the result of demoralization of prices is simply a loss of profit in the end and does not increase business very much.

Michigan.

This has been a good year in our business. While in dollars it probably doesn't exceed last year, yet in bulk of goods I think it is ahead. In this section we have had a very prosperous year. The mines have been working full time and full crews. Lumbering has been pushed extensively. Wages have been good, with plenty of work for all.

In regard to retailers' hindrances will put first the catalogue houses. Second, some wholesale houses, whose representatives will quote and also sell individuals, and not a few call on regularly such as blacksmiths, carriage shops, &c.

The outlook for 1901 is encouraging. We look forward for a good year.

Illinois.

During the year just passed we have sold more goods than in 1899, and 1899 being the banner year up to that date, we feel pretty well satisfied with the year's trade.

Everything in our community, including factories, farmers and mechanics, was never in better shape. Our trouble is catalogue houses and department stores. This simply means more competition, but if we did not have it from that source we would probably have it from some other, so that we have to get along with it. The outlook for 1901 is very bright.

Michigan.

Taking everything into consideration, the past year has been better than previous years. The trade from the farming community has not been so large, but it was more than made up by increased town trade.

The degree of prosperity in this community in general has not been great. The wheat crop was a complete failure in this county. The farmer depends upon this wheat for all luxuries, and many necessities of life. Many of our town people are retired farmers, who live off the proceeds of their farms. Like the farmer, they have no income (practically) this year. A good corn and hay crop was secured, but there is little stock to feed it to and but small profit in selling it.

Over-Competition.

The chief obstacle to the retailer's success is overcompetition. Too many men start in business without a thorough business training. They think they can gain customers by selling at little or no profit. The more means a customer has to buy with the lower the price they will make him.

Hardware Associations.

The catalogue house competition is a very mean one. It can be fought only by the State Hardware Association, which is the best reason every retailer should be a member of such association.

The outlook for 1901 is but fair. Much depends on the crops. A poor general crop will make it very hard sledding for many small dealers in this part of the State.

Missouri.

In a general way business has been good, and collections have been good and everybody is feeling that we are going to have a continuance through the coming year. Our trade has been up to that of former years, and in some lines better, which is all we could ask.

Michigan.

The year 1900, a little better than 1899, is the best year we have had for a good while. The amount of excess in the years 1890 to 1893 was due entirely to the large Bicycle business we did. As to the prosperity in our community, we believe this increase in business is shared by our fellow merchants, and the symptoms of prosperity are decidedly well defined. We do not believe in the principle of "Blessed am he who don't expect anything, he shall not be disappointed," so we are expecting a better business in 1901.

A Conundrum Answered.

In regard to the principal hindrances to the retailer's success, we have no doubt you will have an interesting variety of answers to this question. The catalogue houses probably cut some figure, and we know wholesale houses often cut the retailers' figures, but our answer to this conundrum shall be, We believe there are just two "principal hindrances" to the success of the retailer, the one is lack of capital, and the other lack of ability.

Illinois.

The year now closing has not been as profitable as 1899, owing to declining prices. The first half of 1900 was not as good as 1899, owing to high prices on Nails, Wire, &c. With the drop in Nails, &c., building increased, making the last six months of the year make up for the first six months. Our city, a manufacturing one, is on the up grade. All factories are running

full, and with good prospects of several new factories locating here in the early spring.

The outlook for 1901 is bright. We have a good farming community surrounding us, who have had good crops and are moving them at good prices. We look for much new building and good trade for 1901.

New York.

Hardware Dealers and Hardwaremen.

Our sales the past year have equalled those of previous years, but profits have been less, owing to local causes. Our community, generally, has been prosperous.

We have too many Hardware dealers who are not Hardwaremen—that is, have had but little experience in the business.

The general outlook is favorable for the coming year.

Illinois.

Our business for 1900 has been the largest we have ever had, and will, we believe, prove very profitable. Our holiday trade was very heavy, much better than last year. General business in our community is very good. Mechanics of all classes are hard to get, farmers are very prosperous and are getting good prices for their crops. Bank clearings are the heaviest we ever had in this city.

The outlook for 1901 is without a cloud so far as we can see. We see no reason why our present good business should not continue. The building outlook is bright, and our factories are very busy.

Inadequate Profit.

Aside from local competition, which is at times very severe, our greatest trouble lies in the department stores, and catalogue houses. Many manufacturers, especially of Belting, Packing and Mill Supplies will sell direct to consumers, and call on them regularly. In many cases the margin of profit allowed a dealer over the consumer's is only 2½ or 5 per cent. on such goods as Wire Rope, Emery Wheels, Files, &c.—a profit too small for us to handle the goods.

Minnesota.

The year about to close has been very satisfactory from a business standpoint, when compared with previous years. With the exception of the dollar slump in Nails, prices have been fairly well mantained. The Presidential election did not retard business as much in the West as it probably did in the East, and a fairly good crop of cereals has given the farmers an opportunity to indulge their fancies.

The outlook for business in 1901 is excellent. An abundance of moisture fell during the fall rains and the ground was never in better condition for receiving seed.

A Hint to Manufacturers.

If manufacturers are only content to let well enough alone and do not try to force prices upon the people that are excessive 1901 will be a record breaker.

Michigan.

Our business for 1900 has shown a decided increase in volume. Speaking from a local point of view, the large water power development in this city has put new life into business and we look forward to an exceptionally good trade for 1901.

Jobbers Selling to Consumers.

We find in our section that the principal hindrance tothe retailers' success is that jobbers come into our midst and make an effort to sell both the consumer and dealer. We have established a rule that under no circumstances will we purchase goods from a jobber who does this. However, some of them prefer to take chances with the consumer and consequently we find them our competitors. We believe, however, that the time is not far distant when through the efforts of State organizations this line will be so distinctly drawn that these conditions will be overcome.

The Remedy.

South Carolina.

We find the year just drawing to a close very satisfactory, volume of business being much larger than last year. The development of the South is very rapid and admits of the Hardware store carrying a stock of mill and machinists' supplies which heretofore have had such a small demand, the trade being confined mostly to farmers' supplies. The majority of the people have made good returns from the high price of cotton, as the holiday trade has shown us.

The new year has a flattering outlook and new enterprises are announced every day, making demands for all kinds of Hardware. The Hardware stores are better able to compete for the business of the coming year, as the primitive experience in contractors' supplies of the past two years has given the Hardware trade a knowledge of the stock necessary to carry.

Pennsylvania.

The business for the year 1900 has been in excess of the previous year notwithstanding we were handicapped in this section by the long drought, which resulted in a complete shut down of the lumber industries, which are an important factor in trade in this section. But, while the trade has been curtailed in mill supplies the demand for general Hardware has been very encouraging.

High Prices.

The principal hindrance to trade is the high prices placed on merchandise of various kinds by the trusts and combines, which has caused a decrease in the demand for certain kinds of goods. Especially has this been noticeable in Fence Wires and to some extent in Builders' Supplies.

Present indications point to an increase in trade for the coming year, as prices have been evened up somewhat, and with the political situation settled for the next four year it will no doubt prove a great stimulus to trade in all sections.

North Dakota.

Speaking from the standpoint of the average retail Hardware dealer in North Dakota, I believe the spring opened with one of the brightest prospects for a good year than for many years back. This country being an entirely wheat growing section, conditions are governed almost entirely by the state of that crop and the way it was put in the ground. The past spring having been a particularly early one, the wheat was sown early and up to June 1 all conditions continued favorable for growing grain. After that, or during the period when moisture was required for good crops, we got no rain and in consequence the yield was reduced 60 per cent. Then when harvest came rain came with it and the weather was such from then till freezing that a large portion of the crop cut laid in wet fields till it spoiled. So with these conditions confronting the average North Dakota dealer, it has made the past year's business rather unsatisfactory.

As for 1901 with us, it will depend entirely on crop conditions (Eastern prosperity has but very little to do with us), if we get a good crop no doubt we will have a fairly good year.

Illinois.

Our sales for the year 1900 have been, by a good many thousand dollars, the largest we have ever experienced in the history of this firm, which is 21 years, and we have received good prices for all goods sold. I know of no hindrance to the success of the retail merchants. The outlook for 1901 is even better than 1900 has been

Ohio

Our business for 1900 was the largest we have ever done. We have had more building in our town and vicinity than was ever known before. It was impossible to find a mechanic who had not more than he could do.

While our wheat crop was a failure there was a very large acreage of corn harvested and sold at a good price, which, together with good prices for hogs, cattle, &c., put our farmers on a good basis, and they are the kind that believe in improving and keeping up with the times.

Our business has continued good right up to the present time, which is out of the ordinary. Our holiday trade was excellent, as we made a special effort in that direction. We are preparing for a large trade in 1901 and feel quite sure we will not be disappointed.

Massachusetts.

We have enjoyed a business this year of about the same volume as last, although the sales of some months this year would not correspond with those of last.

The outlook for next year we consider bright. We are looking for somewhat higher prices, but hope they will not boom to a point reached by the last move.

We would like to ask if any of the trade find any fault in the manner in which the Builders' Hardware trade is handled? We find in this section that instead of the old method of the customer coming into our store to select his trim that we are compelled to find the customer and then only to waste endless time figuring with a salesman who may come 100 miles or more from some factory bringingg with him at an extra expense a large heavy trunk of samples. He is the man who can give the cost prices and secure the order after we have figured. We look about and find half a dozen other drummers have appeared all in the same way and all at an equal expense. The goods are bought (they cannot be bought of only one Hardware house), and in figuring up we find that more money has been spent in trying to secure the order than the goods actually sold for. Is this business? Whose fault is it? The dealer's or the manufacturer's? Is the dealer not competent to handle the business? Would it not be best to keep these traveling salesmen at home and let the customer depend on the dealers alone.

Reform in Builders' Hardware.

Connecticut.

Sales for 1900 have been about the same as for 1899 and ahead of the sales for 1898.

Prosperity has been interfered with in this city by the absorption by trusts of several large concerns. Some factories have been closed and in others the output has been restricted. There is constant doubt as to what course the trusts will pursue from day to day. Employees are laid off at an hour's notice with indefinite promises as to future work, to the great injury of the workmen.

The principal barrier to success among retailers is unwise competition. Builders' Trimmings are sold at little or no profit, and on all goods which are sold in any quantity prices are cut ruinously. The department stores, of course, do all they can in the way of cutting.

Unwise Competition.

The latter part of 1900 has been quiet in the building trade, but the outlook is better for 1901, and so far as we can see there is no reason why the coming year should not be a fairly prosperous one.

Minnesota.

In reviewing the year just closing we find that business has compared favorably with former years except during the latter part of 1900. This falling off is due to the partial failure of crops. The drought during the growing season, coupled with the copious rainfall during the season of gathering the crops, rendered the past season the poorest we have experienced in years. The increase in prices helped a little. With good crops this section of the country would have been very prosperous.

With the Presidential election out of the way and values giving fair returns for labor, we look for 1901 to be most prosperous. The decline in Iron products has somewhat diminished profits.

The chief obstacle to the retailer's prosperity is the habit that has become firmly established among quite a class of people of sending to catalogue houses for goods.

New Jersey.

Trade conditions have been very prosperous with us for the last year, our sales sheet showing an increase every month over any year we have ever had, and as near as we can tell our Hardware Department has its share of the increase, and in fact rather more than its share.

The prospects for a good year in 1901 seem excellent to us, and as prices seem fairly steady no doubt profits will be good also.

Michigan.

Our business and the business of this vicinity is better than last year. The prosperity is confined to the cities and villages depending on factories and their employees for trade. Those depending on the farmers complain of poor trade.

Our principal trouble comes from jobbers selling their goods at wholesale prices to the retailer's customers.

We know of no reason why the trade of 1901 should not equal 1900.

Connecticut.

The year 1900 has been a peculiar one in the Hardware business. Although almost every manufacturing town in the country has been very prosperous, yet, owing to the decline in the prices of most Hardware products, the year has not been particularly prosperous for the Hardware store. The uncertainty as to the maintenance of such prices as are controlled by trusts or combinations has caused the consumer in most cases to buy sparingly and in small quantities and oftentimes, where possible, to buy nothing at all.

The high prices on lumber, Iron and all kinds of building material at the first of the year put a stop to building operations in this city and vicinity, and the building trade has been practically dead. This of course has affected such Hardware stores as are more or less dependent on the building trade and their gross sales for the last year will probably be affected by it.

The retail business, however, and by that we mean the cash, over-the-counter sales, has probably been larger with most of us than for several previous years. The community itself is undoubtedly in a very prosperous condition and another year will probably make a much better showing than this one.

In our opinion the Hardware stores are not doing the proportion of business that they are entitled to, and this is due largely, we think, to their inability, through lack of proper training, to meet intelligently the competition of the department stores and the catalogue houses. The Hardware trade has grown up in the belief that the customer must come to the Hardware store for what Hardware he needs, and that no inducement is necesary to fetch him. The principle of the department store is that the customer must be induced to come, and strong inducements are held out for that purpose, and the Hardware store must do the same and must make such inducements, in the way of low prices, superior goods and better service, that it can meet the department store on its own ground by presenting greater attractions. The prices of the catalogue houses must also be met and in that case the local dealer will always have the preference. It is through the unwillingness of the Hardware dealers to adopt such methods that catalogue houses thrive and department stores are allowed to draw all such trade as would naturally drift to the Hardware dealer.

Shortcomings of Hardware Merchants.

Iowa.

Our business for the present year has been very satisfactory as compared with previous years. Every one appears to be prosperous, and our proportion of cash trade this year has been much better than former years. Heavy goods have not done as well as some years, but high prices, we think, have had a bad effect. Shelf goods and Stove trade have been satisfactory.

We think the principal hindrance to the success of the retailer is his great desire to sell on too much time, and to some that he should not sell on time.

Indiana.

Our business for 1900 was very satisfactory indeed. Our customers generally bought more freely, and were willing to pay a fair profit on what they bought. While we did not experience the advances on goods we had in stock that we did the year previous we found the year more satisfactory. Farmers are generally in better condition than they have been for a number of years.

We believe the principal obstacle to the retailer's success is jealousy, or fear that his competitoor will do as much business as he does. We think the sooner a retailer makes up his mind that he must have a fair profit on what he sells, and that his competitor must be allowed

Jealousy Instead of Common Sense.

to sell his share of goods, the better off he will be. We find in a great many small towns two competitors in the Hardware business slashing prices and doing business without any profit, when if they would only get together and talk the matter over in a businesslike way they could both do the same amount of business and at a fair profit.

The outlook for 1901 certainly seems very good in this locality.

Indiana.

Our business is about the same as previous years. The boom last year was no advantage to us in sales or profits as retailer's.

In our community the manufacturers and wholesale dealers have done well the last two years.

Retailers' Troubles. The principal troubles of retailers here are department stores, catalogue houses and wholesale firms who also cater to the retail trade.

The outlook for 1901 in our section is good for wholesalers and questionable for retailers.

New York.

We do not agree with the majority of your correspondents in regard to the great prosperity at the present time and the benefits of the trust boom that we have been passing through. If we could all put our business in trusts and then the consumers get a good bounty from the Government we might make a success of the same, otherwise somebody has to suffer, and we find it is the retail trade and consumers.

Our trade for 1900 would be considerably below 1899 were it not for the fact that we started another new branch store this year. Also our profits will be less, considerably less, than our average profits in the years that are past. It is impossible for us to obtain the same increased prices on goods that we have to pay, as a great many of our customers do not purchase any more than they are obliged to. We are not in a large manufacturing center, and the farming community are not very prosperous this year; in fact, considerably below the average. Mechanics have not been employed as well as usual on account of the high prices of building material.

Profits Less.

We shall work very hard to hold our trade for the coming year, but we do not enter the year with the hopeful feeling that we wish we could have. Prices are much higher than they should be, and as we look at it the tendency will be downward all through the year. Such being the case, it is hard for us to keep our assortment. We will be obliged to buy more from the jobbers at an extra price, as we cannot buy in large quantities for fear the prices will be reduced before we can dispose of the same. It also takes considerable more capital to keep up our stock and carry our customers.

A Discouraging View. Certainly as we look at the situation it is rather dark for jobbers and retailers on account of the trusts, as it is impossible to form any idea of the prices for the future; also on account of the severe drought through Western New York it is impossible for the farmers to have a good year. They have been obliged to sell their stock and plow up their meadows, and with the best of weather they cannot recover the coming year.

Virginia.

Our business in Builders' Hardware during the year 1900 has been very encouraging, and shows a large increase over previous years.

Our community is enjoying a very fair degree of prosperity at this time. Our city is steadily increasing in population and wealth, and improving along almost every line of business. Manufacturing interests are not very numerous with us, but our jobbing trade is growing in a most satisfactory manner.

Concerning the outlook for 1901 we would state that in our opinion the prospects are for a better business in all the lines pertaining to the building trade than in 1900.

Minnesota.

Our trade for 1900 has been ahead of 1899. This is due to our putting in some new lines that the trade has called for in changing from raising wheat to stock. In this community the farmers are hard up, as they have depended on wheat, but the prospect is very good, as nearly all are going into stock raising and creamery business.

Profit on Every Sale. The principal hindrance to the retailer's success is selling goods without a profit, thinking that he can make it up on other sales. Our plan is to make a small profit on every sale. We find it is a winner.

The prospect for 1901 is not as good as a year ago, as the farmers will not forget the short crops that they have had the last two years.

Florida.

The Hardware trade in this vicinity has been better than any previous year since 1894. The degree of prosperity has increased about 50 per cent., and is owing to the cultivation of the rich vegetable lands along the St. John's River. Celery and lettuce are being profitably raised in large quantities. The hindrances are few, if the weather is favorable. Credits are fair, and the retailer needs only proper judgment to know who to extend credit to.

The outlook for 1901 is favorable. This section of Florida is regaining the old time prosperity it enjoyed before the freeze of 1894.

Maryland.

Trade is somewhat better this year than formerly. The crops in this section have been fair and farmers for the most part are in fairly good shape. Obligations are met with reasonable promptness and the community generally is enjoying a fair degree of prosperity. The outlook for trade for the coming year is quite encouraging.

Effect of High Prices.

We have noticed that the sale of Barb Wire and Wire Nails has been checked in consequence of the advanced price.

Louisiana.

This year's business is much better than previous ones and prosperity in this community is good, with a splendid outlook for 1901.

The retailer's chief difficulty is the jobber coming in and selling at such reduced prices to the consumer that the retailer, whose expenses are greater, is forced to meet what prices he can and the rest of the trade he is forced to let the jobber have. We think this is one of the greatest hindrances the retailer can have, as he is forced to buy from the jobber, being unable financially to go to the factory for the great majority of his wants.

Jobbers' Pernicious Activity.

Massachusetts.

We believe that business for 1900 will compare very favorably with 1899. It has been done on a smaller margin of profit, on account of competition, which, of course, results in cutting of prices. We do not think prosperity and increase of business has affected New England as it has the West and South.

The matter of a retailer's success in the Hardware business depends on the ability and amount of energy put into it. Competition is increasing, good clerks—those willing to take an interest in the business—are scarce, and local conditions sometimes hinder retail business.

It is too early to say much about 1901, but we see no reason why we should not have good business.

Pennsylvania.

Business is about the same this year as it was in 1899. The first six months were ahead some 30 per cent. of the same time last year; the last part has fallen behind, the cause being no building of houses here. There have been some buildings put up, but mostly iron mills, which do not take a great amount of Hardware. We are badly in need of houses and a very large building boom is in sight for the coming year.

Demoralizing Suspicions.

The principal trouble with the retailer oftentimes, in my opinion, is imagination. We all imagine others are doing much more business than we are, thus becoming dissatisfied with ourselves, and if we

would apply that time to furthering our own cause it might be dollars and cents to us.

The outlook for 1901 is very bright.

Indiana.

I have found the Hardware business of 1900 about equal to the year before. A failure in the wheat crop prevented large buying by the farmers in the spring, while prices of material retarded large building. The building of small cottages, however, was larger. Department stores interfere to a great extent with our transient trade, though they cut no figure in the building trade.

The outlook for 1901 in this locality is much brighter than for a number of years. One of these causes is local in its nature, as the failure of gas supply in some of the Indiana towns is causing factories to seek a location where they can secure cheap coal, and as our city is the center of a number of railroads and also of important coal fields a number of new factories are being located here, in order to get cheap fuel with good shipping facilities. This is naturally increasing the size of the town and causing a demand for new houses with other improvements.

Pennsylvania.

We have had a very prosperous year in our business, although we have not made the money we did in 1899. In our section of the city the mills are all running overtime and the mechanics have money to buy goods. The new building trade in our section has not been as good as former years, on account of this part of the city being built up, and we have had to go to other parts of the city to get business in Builders' Hardware.

One of our troubles is the formation of so many large manufacturers into combinations, thereby having purchasing agents who buy of the jobbers at prices as good as are given retailers.

The outlook for 1901 is for the retailer to be satisfied with a little business that will give him a living, as he cannot compete with the large jobbers for outside business.

Wisconsin.

Business in general during 1900 has not been as good as in 1899. This being a farming country, our largest business is done in Wire and building material. These goods were too high altogether in price at the beginning of the season; we could not therefore do the business. Improvements were checked all around to some extent. After prices declined somewhat sales were made more easily. The outlook for 1901 seems to be bright.

One of the principal obstacles to the success of the retail trade is the catalogue house, and another that needs mentioning the suspicious and jealous dealer himself.

Kentucky.

It is beyond doubt that our business has increased in the past few years, and that for the year 1900 we have enjoyed a much better trade than heretofore with our line of goods. The prosperity in our community seems to be on the ascent, as the trade are demanding a better quality of goods and seem to have the wherewith to meet their demands.

The only hindrance we find with a retailer's success, and an energetic retailer as well, is that instead of retaining such capital as he had invested beside the profit which he made from this capital, he has withdrawn the bulk of it, putting it into a home, as he calls it, for himself and letting the business shift for itself. We believe that if the retailer would do without his home a little longer, until he has a surplus over and above the amount necessary to carry on business, that the year 1901 would beyond doubt be the acme of business success. We speak frankly in regard to business outlook and feel that 1901 will be a good Santa Claus for business men throughout the land.

One of the Retailer's Mistakes.

North Dakota.

The year 1900 has demonstrated perhaps more than any previous year that North Dakota has taken a permanent place among the States that succeed by diversified farming. We had a very serious crop failure, but the people have been able to hold their own remarkably well and are going forward to another year full of courage.

During the last months of the year business was very much curtailed, but not to the extent that most people expected. The coming year will open up with a lighter business than usual, no doubt, but barring accidents a good business will be rounded out before the end.

Missouri.

This is strictly a farming community, and the money making crops have been a failure for three years, and there are other conditions unfavorable for our town which would not be of any interest to you, being purely local. Notwithstanding these local drawbacks, the country is in a flourishing condition. Our merchants who handle a line of holiday goods are well pleased with their trade. We ourselves have done well this year in some lines, as Wire Goods and Fencing particularly, and we all note good signs for the coming year.

Our chief trouble as Hardware merchants is the fact that groceries, cigar and dry goods stores all pick up some articles that strictly belong in a Hardware store, and then come the "racket," "saving bank" and department stores, which finish up a good deal of what is left. I presume it is of no use to complain. The tendency is to dabble in anything and everything, regardless of neighbor or principle. When you see the largest wholesale Hardware houses doing it, handling such things as Pictures, Glass Ware, Harness, &c., what can be the result? I have been in the Hardware trade over 50 years, and have watched the change to my loss.

Wisconsin.

This has been the best year in the history of our firm, since their establisment in 1888. What we say of ourselves will apply generally to this community. We have had a good crop, prices are good, money plenty, there is a large amount of new buildings and every trade is busy. We look for a great year in 1901. Enough building has already been planned to make it so. We may be optimistic in our views, but we offer them for what they are worth.

Rhode Island.

We believe the sales for this year will compare favorably with 1899, and as prices are lower this year it will show that a larger volume of business has been done. Our factories, machine shops and mechanics generally have been well employed.

The greatest hindrance to the retailer's success, we think, is the small profit, made necessary by competition with manufacturers, who solicit business direct from the consumers. This is getting to be very general.

Contending with Manufacturers.

Many of our cotton mills have erected new buildings or made additions to old ones, but there have been very few nice dwelling houses put up, and what tenement houses have been built were done by contractors, who have, as a rule, no capital and very poor credit.

If the wage earner has as steady employment for the future as in the past, we feel that it will result in more business.

Mississippi.

We take a complete inventory of our stock in June, and our business year runs from July to July. Last July we declared a good dividend on capital invested, besides leaving us a large balance to put to our reserve fund. Business has been steadily improving, and we expect by next July an increased earning; and we can say that the outlook for business is fully as good as last year, if not better.

So far as our city is concerned (I have lived here nearly 50 years), there never was such a bright prospect as at the present time.

We are somewhat interfered with by catalogues from the department stores in large cities; but most merchants should be able to compete with them on the same ground, getting cash on delivery of goods.

Taking it all in all, business prospects are brighter in this vicinity than they have been since the war, and

no doubt will continue so if our money basis will be allowed to remain as it now is.

Indiana.

The volume of business for 1900 has been very satisfactory when summed up as a whole, notwithstanding the almost total failure in succession of two wheat crops.

We encounter a good deal of trouble from competition on the same line of goods handled by exclusive agencies. Manufacturers and jobbers could easily avert this clash in territory and prices by widening the territory of their agents. This would justify the dealer in doing more and better advertising on the special lines, and prices could more easily be maintained.

Exclusive Agencies.

We are encouraged with the outlook for 1901 and fully expect to do a larger business than we did this year, which is 20 per cent. more than 1899.

Ohio.

There has been a good, healthy growth in our business during the past year, as compared with previous years. There does not seem to be any special reason for the increase. There has been but little building, yet the mechanics have all been busy, and they have gone into the winter better hearted than usual. All lines of goods have moved freely, except Hand Hay Rakes and Steel Hay Forks. They have been a drug. And yet we have sold more Hay Carriers this year than usual.

The prosperity of the country has been greater this year than for many previous years. Farm mortgages are being paid off and it is getting to be quite difficult to loan money on real estate security so as to have anything left after paying the taxes. There is less inclination to "jew" and growl at prices than heretofore. We are getting trade from those whom we know have gone through the experience of buying goods from catalogue houses.

We are now standing on the threshold of the centuries. In one we have had our opportunities, our successes, our mistakes. To the other we take our experiences and our hopes. Some of the heritages from the old to the new century are the methods of organization and doing business; of advertising; of display of goods on shelves and in windows; of methods of caring for the cash; of keeping books; of collecting accounts; of watching the expense account. Shall we not take advantage of these experiences so that our hopes may ripen into fruition and success crown our efforts? We see nothing in the new century for us unless we do.

Success in the New Century.

Kansas.

The volume of trade in 1900 was some larger than in 1899, but prices were lower. Farmers and retailers are generally in a prosperous condition.

I think the greatest hindrance to the success of the retailer is, locally, the low price of wheat; in a general way, the trusts, which control prices and in many cases sell in direct opposition to the dealer. Arbitrary freight rules and classifications are not to be lost sight of, either.

Outlook for 1901 is fair to good, if a crop is harvested and the price is high enough to give the producers a profit. Uncertainty as to prices on many staples prevents the trade from buying beyond the immediate future wants. There seems no doubt that prices will rule lower than in 1900. This will check speculative buying and start values toward the figures previous to the high prices.

Get Out of Debt.

Believe it a good time to keep obligations down to lowest amounts consistent with a fair stock. In short, get out of debt and be careful in making new debts.

Wisconsin.

Our business for the first half of 1900 showed a marked increase over the first half of 1899. September, October, November and December, 1900, show a decrease of about 10 per cent. from the corresponding months of 1899. This would indicate more goods sold in 1900 owing to the decreased price of Hardware. Our Christmas trade for 1900 was one-third larger than for 1899. We consider our business for 1900 more than an average prosperous one.

No doubt the shutting down of all our big flouring mills by the milling trust, and the short wheat crop of Northern Minnesota and the Dakotas decreased our business to quite an amount during the last half of the year. Nevertheless, this part of the country is in a prosperous condition. Building operations are unusually active for this season of the year and every indication points to a prosperous year's business for 1901.

Georgia.

The general trade conditions have been better in this locality through the present year than for the last two or three. The country is in a prosperous condition. This is indicated by improved collections and increased demand for goods.

The principal hindrances to the retailer's success are: First, lack of caution in extending credit; second, lack of judgment in buying; third, a disposition to "do the other fellow" by cutting; fourth, failure to keep a complete stock of reliable goods; fifth, lack of attention and knowledge of his business.

Food for Reflection.

As to the outlook for 1901, it affords me great pleasure to say that in an experience of 16 years I have never seen it brighter. The old Southland is moving from under the shadow, and I, for one, would not exchange her prospects to-day for any section of the country.

New Hampshire.

The Hardware trade with us has been about the same during 1899 as in former years. Were not affected here as in many places during the hard times of the past few years. Factories and shops ran about full all the time. During 1900 there was not as much building as year before, on account of the increased expense of doing it, but some branches of business were better, which made about an equal thing of it. Not as much profit as during 1899, on account of the decline in goods.

The greatest hindrance to doing business now is the increase of expenses, while the rate of profit, from one cause or another, is growing smaller. We think most will say the expenses of doing business are considerably more than 10 to 15 years ago, while the ratio of profits is smaller. You have got to sell more goods to keep even.

Business Expenses Increasing.

We see no reason why trade will not be as good during 1901 as the past year. Everything looks favorable now. There will be more building here and most other places.

Iowa.

We have enjoyed a very prosperous year. Our sales are much larger, and, though profits are not what they were last year, yet we have no reason for complaint. We have not noticed any marked decrease in our sales on any particular line by reason of high prices, except on Stoves, which seem to have been hard to make a profit on for retailers. We are expecting next year to be our "banner year," as conditions all point to that everywhere.

Indiana.

The year 1900 nearly held its own with 1899. Most of our merchants are well satisfied with their trade this year. Our city has shown an increase of 25 per cent. in population since 1890. This is a steady growth and calls for much building. Besides completing the finest court house in the United States at a cost of nearly $1,000,000, many churches and other public buildings and many hundreds of private residences have been erected during the past two years. Our city is one of the cleanest, prettiest towns of 50,000 in the country.

The old story of 10-cent stores and department houses applies here, too. The Hardware man cannot well ignore them, and must keep up with the procession. They are sent to remind us that this is a world of trouble.

An Old Story.

The outlook for 1901 seems cheerful. If our trust magnates can control themselves and keep from advancing prices unreasonably a good trade may be expected. But if the experience of 1900 is to be repeated there is but one way to checkmate them, and that is not to build or buy their goods. And this the people will do.

REVIEW OF THE HARDWARE MARKET IN 1900.

WE enter in the following pages with some detail into the principal features of the market during the past year, referring especially to the course of prices, character of demand, &c., in representative lines. In this way the somewhat devious course of trade is best reflected, showing the way in which through a falling market there has been a return to an excellent condition of things, with a demand in most lines which is to be regarded as satisfactory and anticipations of fine trade during the year which has opened. Besides the reviews of the changes which have taken place in prominent goods, letters from representative retail houses in many localities are given in the preceding pages. These will be of value to all who desire to see how the year is regarded by merchants who are in direct contact with the consumers, and whose business is ultimately the measure by which the commercial and industrial situation is to be estimated. It is gratifying to note that most of these letters indicate an excellent feeling and give a hopeful outlook.

Nails and Wire.

Not only from their importance as a staple line, but from the especial prominence which they occupied in the attention of the trade and the exceptional influence which they had upon the market at large, Wire Nails, Barb Wire and Wire products are entitled to the first place in the review of the year's business. Their steady advance during 1899 had a good deal to do with the general advancing tendency of the market, and the changes which occurred in their prices during 1900 influenced the whole market. The year opened with an advance of 25 cents per keg in Wire Nails, which was determined upon December 30. The goods thus reached their highest point, the price being $3.20 to jobbers in carload lots, at Pittsburgh. This price, while some business was done at it, had the effect of discouraging building and limiting purchases to the requirements of the trade. The market, however, continued steady, and few anticipated the drastic manner in which the situation was met by the American Steel & Wire Company.

The sensational feature of the year in the Wire and Wire Nail trades was the cut of $20 a ton on prices made on April 21. This brought the price of Wire Nails down from $3.20 in carload lots, f.o.b. Pittsburgh, to $2.20. Galvanized Barb Wire from $3.80 to $2.80, and plain Wire from $3.15 to $2.15, to jobbers in carload lots. These prices continued without change throughout the balance of the year. The volume of business in Wire and Wire Nails in the first eight months of the year was limited, a number of the larger mills of the American Steel & Wire Company being closed for some months. In the last four months of the year, however, demand improved very much, mill after mill of the American Steel & Wire Company being started up, and at the close of the year this concern were operating practically all their plants to full capacity. At this time there is no indication of a change in the price of Wire products one way or the other. In sympathy with the Wire Nail market price on Cut Nails was reduced on April 26 from $3.05 to $2.05, a reduction of $1 a keg. This price continued without change through the balance of the year. The demand for Cut Nails during the first seven or eight months in 1900 was unsatisfactory, but in the last four months of the year the Cut Nail mills had a fairly large volume of business.

CHICAGO WIRE NAIL PRICES.

The course of prices of single carload lots at Chicago during 1900 and for several years preceding is shown in the following table, the monthly prices being averaged from weekly quotations in our market reports:

Months.	1900.	1899.	1898.	1897.	1896.	1895.	1894.
January	$3.53	$1.59	$1.55	$1.50	$2.42	$0.95	$1.17½
February	3.53	1.73	1.57	1.45	2.42	.95	1.20
March	3.53	2.09	1.55	1.50	2.57	1.00	1.15
April	3.28	2.25	1.47	1.45	2.55	.95	1.00
May	2.53	2.35	1.45	1.42½	2.70	1.10	1.07½
June	2.48	2.60	1.43	1.42½	2.70	1.50	1.20
July	2.43	2.70	1.36	1.35	2.70	1.95	1.20
August	2.43	2.80	1.36	1.37½	2.70	2.20	1.15
September	2.35	3.10	1.45	1.50	2.70	2.40	1.10
October	2.35	3.20	1.47½	1.52½	2.70	2.40	1.05
November	2.35	3.28	1.40	1.50	2.70	2.42½	1.05
December	2.35	3.53	1.37½	1.50	1.60	2.42½	1.00
Average for year	$2.76	$2.60	$1.45	$1.46	$2.54	$1.68¾	$1.11¼

CHICAGO BARB WIRE PRICES

The course of prices of Galvanized Barb Wire, in single carload lots, Chicago delivery or equal, has been as follows in 1900 and several years preceding, our weekly quotations being averaged:

Months.	1900.	1899.	1898.	1897.	1896.	1895.	1894.
January	$4.13	$2.05	$1.90	$1.90	$2.02½	$1.90	$2.25
February	4.13	2.25	1.90	1.85	1.97½	1.90	2.25
March	4.13	2.62½	1.90	1.90	1.95	1.95	2.30
April	3.88	2.80	1.87½	1.80	2.05	1.90	2.20
May	3.13	2.95	1.80	1.80	2.15	1.95	2.15
June	3.13	3.20	1.80	1.75	2.00	2.10	2.20
July	3.10	3.30	1.80	1.75	2.00	2.15	2.25
August	3.10	3.40	1.80	1.65	1.90	2.55	2.25
September	3.00	3.67½	1.80	1.80	1.85	2.85	2.20
October	3.00	3.77½	1.82½	1.80	1.85	2.85	2.15
November	3.00	3.88	1.82½	1.80	1.85	2.85	2.00
December	3.00	4.13	1.82½	1.80	1.95	2.00	1.90
Average for year	$3.39	$3.17	$1.85	$1.80	$1.96	$2.25	$2.18

PRICES OF CUT NAILS IN CHICAGO.

In 1899 jobbers' prices on Cut Nails ranged from $1.40 in January and February to $2.80 in November and December. A steady advance was made through the year. The average monthly quotations from jobbers' stocks in Chicago during 1900 were as follows.

Months.	Price.	Months.	Price.
January	$2.85	July	$2.25
February	2.90	August	2.25
March	2.90	September	2.25
April	2.90	October	2.25
May	2.40	November	2.25
June	2.30	December	2.25

The average price for the year was $2.48.

Steel Goods.

The Steel Goods business last season, which ended in midsummer, was quite satisfactory to the manufacturers and to jobbers as well. The sale in dozens by the manufacturers was less than average of recent years, because of so many jobbers having called for the full limit of their contracts at the end of the previous year when the purchase was made at extremely low prices. Another reason for slightly reduced sales in dozens by the manufacturers was weather conditions—a drought which curtailed the needs for Hay Forks.

The prices this season are, as offered to the trade, a shade higher than last year, but with the prospect of a confidential rebate to jobbers generally after the close of the season. Prices were regarded by the manufacturers last year as lower than they ought to have been, the market price of material being considered. They were set early, after which the prices of material advanced considerably, the advance not being followed by the manufacturers of Steel Goods. Later there was a drop in the prices of material, but moderate, as compared with the heavy advance.

Manufacturers are maintaining their prices, and practically concluded their sales in October for the season's product. The product having been sold, there is no cause for disturbing the prices for the sales.

There is a marked increase in export business, not only covering new fields, but a greater quantity within the markets formerly sold to.

The prospects are for the year ending midsummer 1901

the trade will take more than the average quantity of Steel Goods, and be fairly well satisfied with their margins.

Some new competition exists but it is not likely that it will affect the market, so far as prices are concerned, during the present season.

Horseshoes

The Horseshoe market shows something of a decline during the year, in sympathy with the decline in the cost of the raw material. This is a line, too, on which there has been a good deal of cutting both by manufacturers and the trade at large, and, as a result, current quotations are referred to as leaving but a narrow margin of profit. As giving a general view of the situation, the following review of the market from one thoroughly familiar with the situation will be of interest:

"Machine made Horseshoes, like most goods made of steel and iron, had a checkered experience during the year now closing.

"It will be remembered that the advance in these goods was not nearly as great as the advance in raw material, or in most articles in the metal line; consequently, when the high prices of steel and iron collapsed there was not as great a reduction made on horseshoes as in many other lines. This and the fact that many jobbers had heavy stocks carried over from 1899 caused a very limited demand for Shoes for the first six months of the current year. The manufacturers, however, were firm in their opposition to continued reductions in price, and but one change was made during the year; of a consequence, there was a greater uniformity in manufacturers' prices than for many years. The jobbers and dealers indulged in a large amount of unnecessary cutting in rates, and then complained bitterly of the unprofitable character of the trade. In July, the dealers, finding that the manufacturers were determined not to further reduce prices, began to send in their orders, and as the season advanced the demand became larger, until at last every manufacturer was kept more than busy supplying orders. During these six months scrap, muck bar and steel billets advanced from 10 to 15 per cent. without causing any advance in Shoes, but very materially reducing the profits of the year.

"The export of Horseshoes does not increase largely, owing principally to the fact that every foreign country has its peculiar patterns, and it does not pay to get up the rolls and dies for the very limited quantities they call for. In Great Britain almost every district has its special shapes and weights; most of them exceedingly clumsy and all of them much heavier than American shoers will look at. In France and Germany the tariff is prohibitory; a limited trade is done in South Africa; very little in India; Austria has its special patterns and is supplied from England. A very large amount of missionary work will have to be done before the export trade will amount to anything. The outlook for 1901 is excellent; contrary to the general opinion, there is and has been no trust or consolidation of the machine Horseshoe business. It is well known, however, that the manufacturers meet in a social way three or four times a year and have a sort of gentleman's argument as to prices, which has been kept better than most of such agreements, probably because they are all men who value their word too highly to lightly break it.

"It is not probable that there will be much change in price during the first quarter of 1901; if there is, naturally it will be upward."

Lawn Mowers

The Lawn Mower business was affected somewhat by the amount of goods carried over from the previous year and by the prevalence of exceptionally dry weather. The demand for Lawn Mowers was active in the opening months, but was checked simultaneously with the break in the Iron market. As a result of these conditions manufacturers did not receive as many supplementary orders as usual. Prices of Lawn Mowers had not been materially advanced in sympathy with the increased price of Iron, and this prevented the reaction witnessed in many lines. For the better grades especially they have been quite firmly maintained. A great many Mowers of low grade are sold, but manufacturers note a disposition on the part of the trade to handle better goods. On the cheap Mowers prices are uneven, and the market rather weak. Export trade has of late been steadily increasing, and its volume during the year just closed was large. The prospect seems to be for a steady growth in this business. The outlook for 1901 is regarded as promising, but orders have not been placed by merchants quite as early or liberally as is often the case.

Files.

The volume of business during 1900 was not as large as the previous year, when there was a good deal of speculative buying. Some of the jobbers still have stocks purchased more than a year ago. Prices have been fairly well maintained, but concessions have been made to some extent, especially on goods which are not regarded as of the highest quality. There has been a growing business with foreign countries and File manufacturers are looking forward to the time when they will be sending Files abroad in much larger quantities.

Coil Chain.

The prices of Coil Chain declined materially during the year. This was in sympathy with the course of things in the raw material and also on account of the policy of the leading interest to keep prices at a moderate level and avoid the mistake of making them unreasonably high. Business during the first part of the year was of large volume, but after the break in the Iron market was quiet for several months, recovering tone, however, in the fall. Existing prices are very well maintained. By means of the organization of the Standard Chain Company competition has been very much diminished.

Axles.

The principal event in connection with Axles was the dissolution in the early fall of the association which regulated prices. Up to that time quotations were well maintained, but with the dissolution of the association there began an animated competition which forced prices down. In this way lower prices were developed than had ever before been reached. Some of the manufacturers have refused to meet these extreme quotations, but there is as yet little indication of general improvement in the situation. This condition of things is referred to as a natural reaction from the artificial maintenance of prices by the combination. The outlook for next year is regarded as promising well so far as the volume of business is concerned. At the present time many orders are coming in to the manufacturers, as the trade consider that the purchase of Axles at existing prices is a safe investment. Export business is of larger volume than in former years and is steadily increasing.

Axes.

The Axe market has been fairly steady during the year. Prices have been somewhat reduced in sympathy with the decline in raw material. Foreign business has been large and manufacturers giving attention to it report an important increase in this class of trade. The indications for next year are regarded as very promising.

Augers and Bits.

The year's business has on the whole been satisfactory to manufacturers and there is little reason for complaint in regard to the maintenance of prices. While the year closes with somewhat lower prices than were in force at its opening, the market is regarded as in good condition and prices as remunerative. The volume of business is referred to by some of the manufacturers as having been in excess of even that of 1899. One of the features of the situation referred to with disapproval by manufacturers is the disposition on the part of some of the jobbing trade to put Augers and Bits upon the market under their own special brands, the goods being in many cases of a lower quality than those of manufacturers of recognized position. In December a new list on Ship Augers and Bits was adopted, discounts remaining unchanged.

Wire Cloth

The Wire Cloth market has been characterized by a good deal of uncertainty and irregularity during the year. It opened in January at about $1.40 to $1.50, but a good many heavy orders had been placed in the preceding December at about $1.25. In the early part of the year manufacturers experienced difficulty in obtaining Wire, and this had something to do with maintaining the price. In the spring and early summer months a tendency toward somewhat lower prices became manifest, partly from the jobbers, and partly from quotations made by the manufacturers. As a result it was feasible for retail merchants to obtain the goods during the summer at a price ranging from $1.25 to $1.35. In the fall the quotation in the open market settled to $1.20 to $1.25 to small trade, but careful buyers among the retail trade had no difficulty in obtaining $1.10. Toward the close of the year the manufacturers' price was about $1, but this was not in all cases maintained. Some large jobbing houses in the West have been quoting $1 also, which in some cases included delivery.

Poultry Netting.

The market for Poultry Netting has, during the year, witnessed a considerable decline, in sympathy with the diminished cost of raw material. Prices established in November for the trade of 1901 have been fairly maintained. The extent to which this line is bought in advance of the season in which the goods are sold tends to induce forced sales by the jobbers, at low figures, and the general tone of the market is thus often disturbed.

Shovels and Spades.

Several times during the year, with the changing aspect of the general market, rumors were current that the associated manufacturers of Shovels and Spades would make either advances or declines. This has not, however, in any case been done, and the year closes with quotations where they were in January last. The manufacturers have maintained their organization and, indeed, strengthened it during the year, as they have succeeded in buying out or otherwise making terms with parties who were about to enter the market, so that at the present time there are scarcely any outside Shovels or Spades to be purchased. Several enterprises are, however, reported to be under way.

Window and Door Screens.

The prices on this line of goods have not fluctuated very seriously during the year, but have been slightly irregular, and the year closes with somewhat lower quotations than were current at its opening. A number of the principal manufacturers marketed their goods through the Continental Company, and the fact that their competition with one another was thus eliminated, while at the same time fairly high prices were maintained, had something to do in sustaining the market. The fact that this organization was in operation and that prices were kept at a fairly high level had doubtless influence in stimulating outside competition, and on this account principally it was deemed advisable to discontinue the arrangement and dissolve the Continental Company. The market is thus at the present time an entirely open one, but while prices are somewhat lower than during the year, they are not demoralized, and this line is regarded as in fairly satisfactory shape.

Nuts.

The year closes with prices materially lower than at its opening, and, on the whole, the business of the 12 months has not been entirely satisfactory to the manufacturers. During the six months that followed the break in the price of iron the market was a good deal demoralized and little effort was made to regulate prices. This condition of things continued until about October, when the market assumed a better tone, and since that date several advances have been made and maintained. The present condition is satisfactory to the manufacturers and the indications are that business during the coming year will be of good volume and at remunerative prices.

Iron Rivets.

The Rivet market has, during the year, been affected seriously by the changes in the cost of raw material and also by the extent to which new competition has been developed. While the base discount at the opening of the year was 52½ per cent., the price has been reduced until the base discount is 70 per cent., and even this to a certain extent is nominal, as a good deal of irregularity characterizes prices.

Cast Iron Soil Pipe.

A good deal of irregularity in prices characterizes the market, notwithstanding the influential position occupied by the Central Foundry Company, who maintained for a time the prices they had established, notwithstanding the development of outside competition. The effect of this, however, became so serious that it was necessary for them to recognize it. Efforts were accordingly made to bring all the trade into a strong organization, with a view to controlling output and prices. Such an organization was formed and is now in practical control of the market, there being only one prominent concern outside.

Pumps.

There has been a good volume of business during the year and at fairly satisfactory prices. Quotations on some leading lines are somewhat lower than at the opening of the year. The business has run along pretty even without anything of a speculative character. Both manufacturers and dealers are apparently governed by conservative views. Export business continues to increase. Stocks in the hands of the larger and smaller merchants are of moderate dimensions. Indications point to a large demand in the early part of the year.

Screws.

During the year the Screw market was under the control of the association and until recently prices current at the opening of the year were maintained. There has been the development of outside competition which, while not as yet of serious volume, was regarded with some apprehension by the associated manufacturers and accordingly late in December a reduction of about 25 per cent. was made, with the probability that extras will be given more liberally than before. The arrangement between the manufacturers was changed from a pool to a less formal agreement. In this line the tone of the market is not confident, and it is apprehended that some irregularity in prices may be developed.

Shot.

The past year was rather uneventful so far as the Shot business is concerned. It was of fair volume, and for the most part at fairly satisfactory prices, the fluctuations which were from time to time announced being caused by the changes in the price of Lead, with which the price of Shot closely corresponds. The prosperity which the country has enjoyed is referred to as interfering to a certain extent with the sale of Shot, as persons have been more actively engaged in business than usual and have less time for shooting.

Saws

The demand for Saws has been very active and the capacity of the leading manufacturers has been taxed to the utmost. The volume of business is probably in excess of that of any previous year. Prices have been steadily maintained. This is largely a result of the conservative policy which was pursued during the previous year. There has been more or less cutting of prices by the jobbers, but perhaps not more than is usual. Export trade shows a marked development and American Saws are being sent to practically all parts of the world. The outlook is for a large and profitable business in the near future and at substantially the same prices as are now ruling.

Wrought Iron Padlocks.

The year opened with a good many Padlocks in the hands of the trade, whose buying had been liberal during the previous year. Prices have gradually settled until they are now only slightly higher than before the rapid advance of 1899. The market has been fairly even during the year and quotations have been pretty regularly maintained by the manufacturers. Some increase is reported in export business, and manufacturers are giving a good deal of attention to this matter. On the

whole the indications for business, both at home and abroad, are regarded as gratifying.

Chisels and Drawing Knives.

Prices have shown but minor variations during the year and close about where they started in January. In that month an advance of about 7½ per cent. was made, and for the most part fairly maintained by the manufacturers, but later in the year irregularities were perceptible and the market assumed a somewhat unsatisfactory condition. The manufacturers, however, pulled themselves together again, making a slight reduction from what had been the nominal prices. The new figures made were, however, something of an advance on quotations at which some business had been transacted.

Tacks.

The course of the Tack market has not been very satisfactory to manufacturers. The volume of business has been moderate and prices declined during the greater part of the year. A good many goods were carried over by the trade from 1899, and this fact, together with the declining tendency in prices, limited the demand. Within a short time, however, there has been some improvement in the market, and some of the manufacturers are naming higher prices, and the volume of business has increased. There is still a good deal of irregularity in quotations and the margin of profit is meager. No attempt has been made during the year to control the situation by concerted action between the manufacturers, the market being entirely open. The export business has not shown any material increase. With the somewhat better condition of things in which the year closes the outlook for 1901 is regarded as fairly promising.

Wagon and Carriage Springs.

There have been some fluctuations in the prices of this line of goods during the year, as there has been a decline in sympathy with the course of the Iron market. Princes are accordingly about 1 cent per pound lower than in January last. The market has not been, however, entirely even.

Scythes

The market for Scythes has been uneventful. The manufacturers have been in a position to maintain rigidly their established prices, and with practically no outside competition the market has been steady. An advance of 25 cents a dozen went into effect early in January. In marketing the goods the association use classified lists, by which the jobbing houses are divided into two classes, respectively designated A and B, other merchants being expected to pay the higher prices as per the C list. The principal feature of the trade during the year has been the repugnance on the part of both jobbers and retailers to buy Scythes at the unreasonably high prices established by the pool, and as a result only a light business has been done for next season. The sentiment among the trade appears to be general that the prices demanded are unreasonable, and a good many houses are intending to make no effort to sell the goods under the present conditions. While the market in this line has not been seriously affected by outside competition, the prospect that Scythes will be put on the market before long by the Kelly Axe Mfg. Company tends to strengthen the opinion of the trade that present prices cannot be long maintained.

Tinware.

Last year's business was active, with evidence of an increasing disposition on the part of dealers to handle goods of better quality than was the case in the period of depression recently existing. The outlook for the coming year is favorable and a steady and healthful trade is looked for in view of the general conditions which prevail. The possibility of a scarcity in some staple lines is suggested if the demand should be as large as anticipated, and higher prices are referred to by some manufacturers as not unlikely to result.

Machine Screws.

Manufacturers report a good volume of business during the year, and a present demand which promises well for 1901. Prices suffered some demoralization, but the market has recently assumed better shape and the outlook for next year is very encouraging.

Rubber Belting

The business of the year has as a rule been fairly satisfactory to the manufacturers, and the market has on the whole been steady in price without very important fluctuations. A good deal of Belting of a low grade is offered at low figures and this interferes to some extent with the sale of regular goods. The manufacturers note, however, something of a reaction, as there is a tendency on the part of consumers to use goods of recognized quality. Export business has been of fair volume and is increasing. The outlook for 1901 is regarded as encouraging, a good trade being expected both at home and abroad.

Picks and Mattocks.

This is one of the lines in which there has been a notable decline in price during the year, and quotations are referred to by the manufacturers as uncomfortably close to cost.

Twist Drills.

This is a line in which during the previous year prices had not been radically advanced, and as a natural result there was not in 1900 any important break in quotations. A reduction of about 5 per cent. was made in December. The volume of business with the manufacturers has been large and the export trade, which is beginning to assume considerable volume, is one of the features of the year's business.

Heavy Hammers.

The association of the manufacturers of Heavy Hammers, Sledges, &c., was dissolved during the summer, and the market has since that time been an open one, with a good deal of irregularity in quotations and the development of low prices. The figures at which the goods are quoted are thus materially lower than at the opening of the year. The volume of business has been large, and so far as the amount of trade is concerned the outlook for next year is regarded as indicating a large volume.

Builders' Hardware.

The prominent manufacturers of Builders' Hardware have been working with a good degree of harmony during the year, and while prices have not been maintained at the level they held in January last there has been rather more regularity than usual in this line. In September an important reduction in price was made, prices going back to where they were in July, 1899. On the large and varied line of goods covered by the association a fairly satisfactory condition of things continues, and competition is for the most part conducted on reasonable lines.

Steel Squares.

The prices established by the associated manufacturers of Steel Squares have, as a rule, been well maintained during the year. In December a slight reduction was made, the published discount being put at 70 per cent., but relatively small houses are able to obtain without difficulty a discount of 70 and 10 or 75 per cent.

Rope.

At the commencement of 1900 Manila Rope, on a basis of 7-16-inch and larger, was quoted at 15½ cents, and Sisal Rope, on the same basis, at 10½ cents per pound. At this time the hemp ports of the Philippines were still closed. The price of Sisal hemp has followed the fluctuations of the Manila hemp market to a considerable extent throughout the year. The foregoing quotations continued during the months of January and February, with a slight weakness in Sisal during the latter month. The demand was light for the next two months and irregularities in price developed, followed late in May by a reduction of 1 cent per pound. About this time Manila hemp began to arrive in this country and the trend of prices was downward until October, when they reached the lowest point of the year: Manila, 9¼ cents; Sisal, 6¼ cents per pound. Before this point had been reached prices had become unsatisfactory to manufacturers. About November 1 advances in the price of hemp stiffened the Rope market, and buying became more liberal, followed by an advance of ½ cent a pound by the last of the month. By the middle of November orders began

falling off, and the market softened up. During the early part of the year high values did not offer inducements to merchants to buy in large quantities, and on a declining market later in the year they continued a hand to mouth policy of supplying their wants. Mixed Rope, of which much was heard, but of which no manufacturers would acknowledge themselves makers, was a disturbing element in the market. During the early part of the year Jute Rope came into prominence as a substitute for the higher priced commodities, and was quoted at 6¼ to 7 cents, according to quality. It has now declined in price to 6 to 6½ cents per pound. The following comparison of values shows the highest and lowest prices reached by Rope during the past two years:

	—1899.—		—1900.—	
Manila, 7-16-inch and larger	7¼c.	15¼c.	15½c.	9¼c.
Sisal, 7-16-inch and larger	7 c.	10 c.	10½c.	6¼c.

The year closed with Manila at 9¾ to 10 cents, and Sisal at 6¾ to 7 cents per pound on a basis of 7-16-inch and larger.

Binder Twine

At the opening of the year few orders had been placed for Binder Twine, both on account of high prices and because considerable Twine had been carried over from the season of 1899. Eastern manufacturers were quoting Binder Twine as follows, in carload lots, f.o.b. New York, Philadelphia or Boston, with an advance of ¼ cent per pound for less than 10,000 pounds and an advance of ⅛ cent per pound for over 10,000 pounds and less than a carload:

White Sisal, 500 feet to pound.....11¼c.
Standard, 500 feet to pound.....11¼c.
Manila, 600 feet to pound.....14¼c.
Pure Manila, 650 feet to pound.....15¾c.

Manufacturers were not generally guaranteeing prices and were pursuing a conservative course as to the quantity of Twine turned out. Only a sufficient quantity of Manila Twine was manufactured to fill actual orders, as the difference of 4 cents or more between the price of Sisal and Manila Twine made the latter too expensive for general use. Up to the last of March prices were firm, as a rule, but some orders had been accepted by factories at ¼ to ½ cent below the regular quotations. Merchants were slow in placing orders, and some large dealers were selling short with the expectation of covering their requirements when they had ascertained what they would be. During June and July the demand for Twine slightly preceded the advent of harvest from South to North, and prices receded with the last opportunities for cleaning up stocks. This was particularly so in the Northwestern States, owing to the partial failure of crops. As the wheat harvest neared the close Sisal and Standard Twine were quoted, f.o.b. New York, at 8 to 8½ cents per pound.

White Lead.

At the opening and closing of the year the price of White Lead in Oil was the same—6½ cents per pound in lots of 500 pounds and over, and 7 cents per pound in lots of less than 500 pounds. During June prices were reduced ½ cent per pound, to 6 and 6½ cents, according to quantity, these representing the highest and lowest figures for the year. During August prices were advanced ¼ cent per pound, and late in October another advance of ¼ cent was made, resulting in quotations of 6½ and 7 cents, at which figures the year closed. The uniformity of prices throughout the year was remarkable in view of the wide range of prices for Linseed Oil and the erratic character of the Oil market. During January the demand for Lead exceeded that for the same period of the previous year. Through February the demand was good, while for March it was but moderate, as stocks purchased earlier in the year had not become depleted. In April and May orders were light, owing to labor troubles in the West and other adverse conditions. During June large dealers were shading manufacturers' prices, and the last of the month manufacturers reduced prices ½ cent per pound. This did not stimulate business and throughout July orders were for immediate requirements only. The advance of ¼ cent in price on September 1 came as a surprise to the trade and had somewhat of a stimulating effect upon business. The demand continued fair, but not excessive, during the month, with but little inquiry beyond the first of the year. Large orders were placed soon after the middle of October, in anticipation of an advance in price, which came October 25, the quotation being made ¼ cent per pound higher. Through the balance of the year the advance was sustained, notwithstanding the downward tendency of Linseed Oil, and spring delivery orders were placed during December by jobbers to a considerable extent.

Turpentine.

Turpentine has been subject to frequent fluctuations in prices during the past twelve months, quotations seldom being the same for any two consecutive weeks. The following range represents the highest and lowest prices in the New York market during the year:

	April 12.	September 6.
Southerns	57	36½
Machine made barrels	57½	37

Prices gradually advanced from the first of the year until the middle of April, from which time until September the decline was constant. The advances and declines for the year were, for the most part, by ½-cent stages. At high prices large consumers refused to come into the market, but when values declined buying was soon resumed. This market also sympathized with that of Savannah, which was favorably affected by large periodical export shipments, and unfavorably affected by an absence of foreign demand. Prices were well sustained through January and February in view of the near approach of the new crop, with an active demand through March. From the middle of April the decline in prices was gradual until the early days of September, when they reached the lowest point of the year. From that time until the first of November prices fluctuated between 40 and 45 cents per gallon, after which they fell off on a dull market, touching 38½ and 39 cents at the close of the year.

Glass.

The past year has been one of frequent and annoying changes in prices to merchants, and of low prices and limited profits to manufacturers. The American Window Glass Company did not start their factories after the annual shut down of the summer of 1899 until January 2, 1900. A number of the independent factories were in operation by November 1. January opened with quotations from factory for carloads at 90 per cent discount for single and 90 and 10 per cent. discount for double strength Glass. Considerable business was done at these figures. The distribution of new Glass from factory began about February 1 and the American Window Glass Company announced the following discounts for carloads, f.o.b. factory, for the East:

Single Strength:
- First Bracket .....85 and 25 %
- Second and Third Brackets .....89 %
- All above .....90 and 5 %

Double strength:
- First five Brackets .....89 %
- 60-inch Bracket .....90 %
- 70 to 100 inch Brackets, inclusive....90 and 10 and 5 %
- All above .....90 and 20 %

The Eastern division of the jobbers' association fixed the extreme price for Window Glass east of the Alleghanies at 85 and 10 per cent. discount for the first bracket, and 85 and 20 per cent. discount for all other brackets, of either single or double strength, for less than carloads from store. Manufacturers' prices to jobbers continued in force from February until August. The National Window Glass Jobbers' Association made several changes in discounts, covering carload and less than carload lots, during March and April, the latter prices also remaining in force until August. Demand for Glass throughout the spring was not large except for small sizes, which came principally from the South. Trade was comparatively quiet in the East, while building trade strikes affected Chicago and the West unfavorably. Though some of the combined factories were

started during the first week of September, they were not fully manned. Some independent factories were also started about that time. It was estimated that the cost of manufacture for the present fire would be about 12 per cent. higher than for the preceding one, and the following discounts were announced in August:

Carloads from Factory.

Single strength:
- First bracket.....85 and 10 %
- Second and third brackets.....85 and 15 %
- All above.....90 and 5 %

Double Strength:
- First five brackets.....89 %
- 60-inch bracket.....90 %
- 70 and 100 inch brackets, inclusive...90 and 10 and 5 %
- All above.....90 and 20 %

Eastern Jobbers, Less than Carload Lots.

Single strength:
- First bracket .....80 and 10 and 5 %
- Second and third brackets.....85 %
- All above.....85 and 20 %

Double Strength:
- First bracket.....85 %
- Second, third, fourth, fifth and sixth.....85 and 10 %
- All above.....85 and 20 %

Western Jobbers, Less than Carload Lots.

Single strength:
- First bracket.....80 and 20 %
- Second and third brackets.....85 %
- All above.....85 and 20 %

Double Strength:
- First five brackets.....85 and 10 %
- Sixth bracket.....85 and 20 %
- All above.....85 and 25 %

Ten per cent. extra for single strength, A. A.

Freight equalized with nearest jobbing center.

The jobbers' association adopted a new list on September 1, from which to sell in less than carloads, while they continued to buy carloads from the manufacturers' list of January 1, 1898. The object of the new list, it was stated, was to have the same discount for both single and double strength Glass, to do away with the numerous discounts previously prevailing and to cover the entire country. The last of September prices on the new list were announced, a discount of 85 and 20 per cent. for all single and 90 per cent. for all double strength Glass. These prices applied to the entire country. The jobbers' association advanced the price of all double strength Glass from 90 per cent. to 85 and 25 and 5 per cent., and an advance of 10 per cent. was added for all first quality Glass, both single and double. Later they quoted carload lots of Glass at manufacturers' prices, with 5 per cent. added. These prices ruled during the remainder of the year. The object of the low prices made to jobbers had been to discourage outside competition. Notwithstanding this, the number of independent factories increased during the year, until their capacity in pots is now estimated at about 1200, against about 1700 of the American Company. The independent factories felt the disadvantage under which they were working, having in most instances to meet prices made by the American Company, and as individual factories they were unable to sell the jobbers' association any Glass. During October a movement was put on foot to form the independent factories into an association of some kind. After many discouragements the promoters succeeded during the latter part of December in organizing the Independent Glass Company, capital $300,000, for which a charter was secured. They prepared to act in harmony with the American Company regarding prices. The latter prepared a new list, so arranged, it is understood, that one discount will cover the entire list, which is to go into effect on January 1, 1901. This list is given in our regular Glass report, under Notes on Prices. The Independent Company have had in preparation a new list, which, it is supposed, will conform to that of the American Company. It is possible that prices will be advanced with the new year. The century thus opens with a prospect of peace in the Window Glass business. How long it will continue remains to be seen.

Linseed Oil.

Unusual conditions have existed in the Linseed Oil market during the year, resulting in higher prices being reached than for many years, and a range of 25 cents between the lowest and highest prices of City Raw Oil, as follows:

	January 4. Cents.	October 20. Cents.
For five barrels or more	.50	75
Less than five barrels	.51	76

Outside brands have been 2 to 3 cents below the price of City Raw as a rule. The manipulation of the flaxseed market by the controlling interest had proved so successful for them during 1899 that the attempt was continued in 1900. Last year prices of Oil were advanced on a large crop of seed, and toward the end of the present year prices were reduced upon a supposed short crop. On a market governed by natural conditions the probable trend of the market could be reasonably forecast for two or three months in advance, but with the uncertainty prevailing for the last two months dealers have been all at sea. Between January 4 and April 5 of this year the price of Oil had been advanced 13 cents per gallon, to 63 and 64 cents, according to quantity. Even at a price 10 cents lower than this Oil was lower than the price of seed would justify, and as seed advanced the price of Oil was kept proportionately low. This resulted in a hardship to independent factories who did not control the seed market, as Oil could not be made from seed bought at the time and be sold at a profit. Large dealers were not in sympathy with the forcing up of prices. Contracts had been placed for considerable Oil during the last of January, when quotations for small lots were 56 and 57 cents, according to quantity. During May demand was light. The estimate made by some of the new seed crop was 25,000,000 bushels, the largest the country was ever credited with. Seed continued to advance in the face of the large estimated crop during June, and the middle of July the first carload of new seed arrived at Chicago. Oil for August delivery was offered in large lots at 57 cents, and for September delivery at 45 cents per gallon. Little business was done at these figures. By August seed had declined, but Oil had reached 67 and 68 cents for less than carload lots, according to quantity, with light demand. By September the price had fallen off 2 cents per gallon, and October 1 saw the price 61 and 62 cents. Purchases were only for small lots, and the market was without stability. Within three weeks prices had advanced to 75 and 76 cents, increased values being attributed to short interests in September Oil, together with the small quantity of seed which had reached the market. The general impression prevailed that the large estimate of the seed crop would have to be cut down. The trade at this time could form no idea of the future of the Oil market and were conservative in their purchases. About the middle of November the trade were surprised by a deduction in the price of Oil to 67 and 68 cents. This was the first intimation of any disturbing influence, and was caused by passing of a quarterly dividend by the controlling interest. On November 29 there was a reduction of 4 cents per gallon in the price of Oil, and on December 4 a further reduction of 3 cents, bringing the price down to 60 and 61 cents. As the last reduction followed an advance in seed of the day before, it was difficult to understand to what end the Oil market was being manipulated. The market during the last month of the year was sensitive and unsettled, with little Oil changing hands and large buyers looking for lower prices.

Bright Wire Goods

The past year has been in some respects quite unsatisfactory to the manufacturers of Bright Wire Goods. Prices have been irregular and the agreements between the manufacturers have not in all cases been adhered to.

Sash Weights.

Manufacturers of Sash Weights have little reason to complain of their business last year. January opened with a good understanding among them in regard to prices and a fair demand, so that the goods sold liberally during the first three months. On the break in the Iron

market purchasing was materially curtailed, and the market developed weakness, which resulted in a decline of from $3 to $4 per ton. After about two months of unsettled business the market improved materially and the volume of business has been increasing with a perceptible improvement in prices. The outlook for 1901 is generally regarded as bright in view of the prospect that there will be a good deal of building. During the year the manufacturers have endeavored to dispose of their goods in adjacent territory, and the extent to which they have been enabled to do this has materially increased their profits. An increasing demand for Sash Weights in foreign countries is reported, South America, Africa, Australia and Europe being specially mentioned.

Carriage Bolts, Machine Bolts, Etc.

On this line the fluctuations in price during the year have been perhaps as extensive as any. The prices which have prevailed during the twelve months ranged from the highest point reached in the recent boom to a figure almost as low as prevailed in the times of demoralization previous to the long series of advances. The year opened with common Carriage Bolts at the regularly announced discount of 45 and 5 per cent., but soon, in sympathy with the break in the iron market, the price began to decline, until in the early fall the discount was something better than 80 per cent. Since that time there has been a gradual recovery, and by successive advances the goods have reached the present price of discount 70 and 2½ per cent., with the usual extra 10 per cent. to the large trade. The last two months have been characterized by an active demand and the manufacturers refer to the situation as satisfactory and the outlook promising.

Chicago Hardware Trade in 1900

The Chicago Hardware interests enjoyed another exceedingly good year in 1900. It is believed to have been a year of fully as large a trade as 1899, although that will go down in history as the year of the great boom. Possibly, profits were not so large, because jobbers were not, as in 1899, in possession at the beginning of the year of large stocks of goods bought at low prices on which great advances were subsequently realized. But it was a much more satisfactory year in that respect than had been anticipated. The recession from high prices after a boom is usually accompanied by losses on stocks of goods, which must be sold at declining rates. But the Chicago Hardware merchants had purchased very conservatively when prices reached their high point about the close of 1899, and were not caught with large accumulations of dear merchandise. The descent to a lower level of values was accomplished in most lines of goods gradually and satisfactorily. But this was due to the remarkable character of the demand from their customers, which persistently continued active through what would otherwise have been the most trying and critical period of the year, when prices were declining almost daily. The results of the year's business, now that the events of the twelve months can be reviewed, are most remarkable considering the influences of an adverse character that were encountered. The most important of these were as follows: Prices forced so high at the beginning of the year that they began to be considered prohibitory by a large percentage of buyers and consumers; labor troubles of various descriptions in different localities, but more especially in the city of Chicago; the worst drought ever known in Northern Minnesota and the Dakotas, heavily reducing the wheat crop; the Presidential election, with its preliminary campaign of four months' duration, usually quite a disturbance to business; and a great decline in Iron and Steel prices, which ordinarily causes Hardware buyers and consumers to postpone filling any but their absolutely pressing wants until they believe bottom has been touched. The strike or lockout in the Chicago building trades was quite a serious matter, being far out of the ordinary. It began early in the year and continued until late in the fall, completely paralyzing building operations, and causing thousands of men to lie idle. The Hardware trade suffered from the loss of business in building materials, Builders' Hardware and Mechanics' Tools, and it is estimated that for this reason the city business of the Chicago jobbers was cut down more than 50 per cent. in 1900. Yet this was fully made up by increased country business, and the other adverse influences were also unable to seriously impair the aggregate business of the year. It must be admitted that 1900 opened with glittering promises of heavy business. Country merchants could not wait for traveling representatives to make their calls after their usual annual trip to headquarters, but the first week in January sent in good orders by mail. Retail dealers and their customers were in easy financial circumstances and bought freely. Farming communities were rejoicing in unprecedented prosperity. Great activity prevailed in the lumber and mining districts and supplies were in heavy demand from those sections. Advancing prices seemed to have no effect in checking trade. Wire Nails and Barb Wire were advanced early in January $5 per ton, and in other lines an advancing tendency was apparent. Buyers appeared to have no stocks, as orders were mainly for small lots, but they were repeated frequently, keeping up the volume of business. An exception occurred in the case of spring goods, large shipments of which began to be made to retailers in January, who ordered stocks of them thus early so as to be sure to have them when needed by their customers. The scarcity of seasonable goods which had been experienced for several successive times seemed to make such early preparation advisable. Much outdoor work was prosecuted this month, as the weather was quite mild.

Continued heavy business was enjoyed in February. Very severe weather induced a much later trade than usual in Stove Accessories, but the general line of Hardware was freely bought, and spring and summer goods were shipped in large quantities. Jobbers profited in a peculiar manner from the high prices, as many goods usually sold direct by manufacturers to retailers were no longer ordered by them in the necessary quantities, but were bought from jobbers in small lots as required. It was observed by this time that new stocks were not being so freely ordered as in 1899, but nevertheless the trade of the month was larger than for the corresponding time in the previous year.

The deterrent effect of high prices began to be felt in March. Goods on which great advances had been made were in slower demand. Reports of postponed building operations until prices of materials were lower became quite frequent. The Chicago building trades labor trouble, which began in February, became a matter of some moment this month. Toward the close of the month a good demand was experienced for Gardening Tools and other articles needed by farmers in spring work.

Despite vagaries of the weather, complaints of high prices checking trade, and the backwardness of building operations, sales for the first half of April carried a larger tonnage, and therefore a much higher value, than in the corresponding period in the previous year. Business was checked for the last third of the month by the reduction of $1 per keg on Wire Nails and $1 per 100 pounds on Wire, which occurred on the 21st. A sweeping cancellation of orders followed, and business halted while merchants endeavored to grasp the true situation.

An unsettled feeling prevailed in the early part of May, but it gradually wore off, as retailers were found to be compelled to make frequent renewals of their stocks. The consuming masses of the country were in easy circumstances and paid no attention to market reports, hence the demand on retailers kept up and they were forced against their inclination to continue to buy, although they would have preferred to wait for lower prices. But they only ordered small quantities, handling very light stocks. Jobbers pursued the same policy, buying from manufacturers as sparingly as possible. This course was pursued for months. It proved to be a most fortunate condition of trade, as the declining prices of the manufacturers were thus easily carried along the line with little loss through depreciation of values on goods in stock. Despite the most cautious buying, small orders were so steadily repeated that the volume of business continued heavy.

Trade in June, July and August was of the usual

summer character, the volume of business being smaller than in the spring months, but running along quite evenly within its narrower range. The adverse influences of the year were most strongly felt at this time. In August the demand for goods began to increase, the movement of such staples as Nails and Wire expanding rapidly.

September was a month of steadily increasing activity. Jobbers bought from manufacturers more conservatively than earlier in the year because prices were falling steadily, but they were compelled to replenish their stocks constantly to meet the wants of their customers. Orders were invariably small, but so numerous that the trade of the month was easily 10 per cent. larger than for the corresponding month of 1899, when values were from 10 to 40 per cent. higher. The Chicago jobbing houses found their facilities strained to meet the demand and frequently worked their packing forces at night.

The activity increased in October, the business of that month being estimated to have exceeded the previous October 25 per cent. The difference in prices was thus more than made up by the quantities of goods sold. A noticeable increase was observed in the demand for classes of merchandise considered luxuries, thus demonstrating the prosperous condition of the people. Although the volume of business was so large the character of the buying did not change, jobbers continuing to purchase from manufacturers merely enough to cover their weekly wants while retailers bought little and often. Everybody but the consumer was prompted to be conservative in stocking up in view of the approaching Presidential election.

November and December broke the record for those two months in the Chicago Hardware trade. The result of the election was wonderfully stimulating. Immediately afterward jobbers and retailers began to order freely for stock. They feared no further recession in prices, and the outlook for business was never brighter. The fall crops were large and were bringing good prices, labor troubles were ended, building trades were becoming active, working people were well employed and the purchasing power of the masses was never greater. Light stocks everywhere along the line caused urgent demands for prompt shipment and packing forces worked night and day for the greater part of every week almost to the end of the year.

The prospects for 1901 are of the most encouraging character. A heavy trade seems to be positively assured for the first six months. After that much will depend on the crops. Meanwhile the Chicago wholesale houses are making preparations to handle a larger trade than that of 1900. They are improving their facilities and increasing their forces of employees. The most important step in this direction is the announcement by Hibbard, Spencer, Bartlett & Co. that they are arranging to erect a large warehouse convenient to dock and railroad which will enable them to greatly enlarge their business.

Refrigerator Notes

Maine Mfg. Company, Nashua, N. H., have just issued catalogues of their White Mountain and Maine Refrigerators, with folder devoted to their North Pole line, in which attention is called to a number of additions and improvements which have been made for the present season. Particular mention is made of the Maine Hardwood Boston Pattern Refrigerator, which for the next year is fitted with the patent Maine ice grate and removable flues. It will have a larger ice chamber than heretofore and will be fitted with a lift-up top. They are also making this Refrigerator with extra large water tank, which is filled from the top, in response to many calls which they have received for that type of construction. This year the company are making a specialty of Grocers' and Butchers' Refrigerators, which are handsomely fitted up with beveled glass mirror plates and also glass doors. The latter pages of the White Mountain catalogue are devoted to the Maine Window Screen Frames, Children's Rockers, Blackboards and Desks, Hard wood Flower Stands, &c., which the company also manufacture.

Cooper & McKee, 113-121 Gwinnett street, Brooklyn, N. Y., have issued a catalogue showing their line of Refrigerators and Ice Chests for 1901. In addition to their regular lines of New Columbia, Champion, New Domestic and Household Refrigerators, they are making a full line of glass lined Refrigerators, to the merits of which they call special attention. They are of cabinet workmanship and cabinet finished, the trimmings, combination spring catch locks and hinges being of solid bronze. They have automatic siphon attachment under absolute control of the lower door.

Eclipse Refrigerator Works, Hickok & Hendee, proprietors, Burlington, Vt., are distributing their illustrated catalogue for 1901 of the Eclipse Cleanable Dry Air Refrigerators. The line embraces domestic Refrigerators, with and without water coolers, Grocers' Refrigerators, Ice Chests, &c.

John C. Jewett Mfg. Company, Buffalo, N. Y., for whom Neal & Brinker, 18 Warren street, New York, are Eastern and export agents, have issued their catalogue for 1901 of the Jewett Dry Air Refrigerators and Ice Chests. The company state that they have added to their line the Economic, and to their line of Palace Refrigerators they have added two smaller sizes. In their Labrador and Queen styles of Refrigerators they use their patent removable ice chamber, which is referred to as insuring perfect circulation. They have also put on the market a line of tile lined Refrigerators, to which they call special attention.

Avon Design.

Reading Hardware Company, Reading, Pa., and New York, have just added to their extensive line of art hardware a new design in the Elizabethan style, which will be known as the Avon. The ornamentation of the Avon

Inside Door Knob and Escutcheon, Avon Design.

design, which is faithfully repeated in all the various escutcheons for front and inner designs, as well as in the smaller trimmings, is not only handsome, but a fine example of the style of ornament prevailing in the time of "Good Queen Bess." No attempt has been made to economize in size or weight of material, all the pieces having a rich and substantial appearance that will commend them as being admirably adapted for use on fine buildings, where the element of price is not a prime consideration. This design is made only in genuine solid cast bronze metal or brass, and can be furnished in all finishes suitable for this class of metal work.

Farmers' and Machinists' Universal Tool.

Utica Drop Forge & Tool Company, Utica, N. Y., for whom Smith & Hemenway Company, 296 Broadway, are direct representatives, are manufacturing the No. 2000 farmers' and machinists' universal tool, illustrated herewith. This is a combination tool which can be used for a number of purposes and is said to be forged from

No. 2000 Universal Tool.

Brescian tool steel, carefully hardened and tempered. It can be used as a flat nosed plier and burner plier; there are three wire cutters, a screw driver, reamer, awl and wire holder, pipe grip and light wrench, wire splicer, and it can also be used as hog ringer.

Miscellaneous Notes.

The William Schollhorn Company.

The William Schollhorn Company, New Haven, Conn., have increased and improved their line of pliers, nippers and punches, which they refer to as being constructed on a new principle, embodying many new and useful features, the most prominent of which is the parallel moving jaws in their high grade line of goods, which gives them a vise grip. Their line for mechanical and household users is so varied that the tools range in retail price from 5 cents to $2 each.

Hindley Mfg. Company.

Hindley Mfg. Company, Valley Falls, R. I., for whom Alder & Boyd, 37 Warren street, New York, are exclusive selling agents, are about to put on the market tempered steel taper pins, and expect in the near future to also manufacture a variety of wire specialties. This concern in a regular way are manufacturers of spring cotters and flat spring keys.

Improved Ran-tan-ka-rus Razor.

Smith & Hemenway Company, 296 Broadway, New York, have recently brought out an improved form of the Ran-tan-ka-rus razor, manufactured in Sweden. The blade of this razor is made from about 60 small wires, cold drawn and hot forged into bar steel, giving, it is said, a Damascus effect. The back is straight and suitable for the purpose for which it is intended. The grinding is referred to as an extra long Hamburg roll, and we are advised it is impossible to "dub" the edge in stropping, as the long roll acts as a guide to keep the cutting edge from striking the strop first. This razor is peculiarly suitable for barbers' use, and is made in the usual sizes.

McCabe New Parlor Door Hanger.

The McCabe Hanger Mfg. Company, 532-542 West Twenty-second street, New York, have just brought out the McCabe new parlor door hanger, as here illustrated. A feature of this hanger, aside from its intrinsic merits, is the fact that, being made by automatic machinery created for this purpose, it can be marketed at a lower price than other hangers they have previously brought out. It has ball bearings, case hardened parts and fiber wheels. The bearings are constructed with the same care as those for bicycles, thereby materially reducing friction. The track is made of cold drawn No. 15 gauge steel, with a parallel slot having flanges on both sides. The inside surfaces of the track in which the ball bearing

Fig. 1.—Sectional View of Ball Bearing Carriage.

carriages travel are as smooth, it is said, as it is possible to make them. There is an adjustment on the track so that the doors may be readjusted, if necessary, at any

Fig 2.—Sectional View of Track and Plate.

time. This hanger is similar in appearance to their No. 2, which is referred to as in use in fine residences both in this country and abroad. The reason for the production of the hanger here illustrated, we are advised, has been to make it as nearly perfect as possible, while pricing it so as to bring it within the reach of the speculative builder and contractor, which is made possible by the automatic machinery referred to.

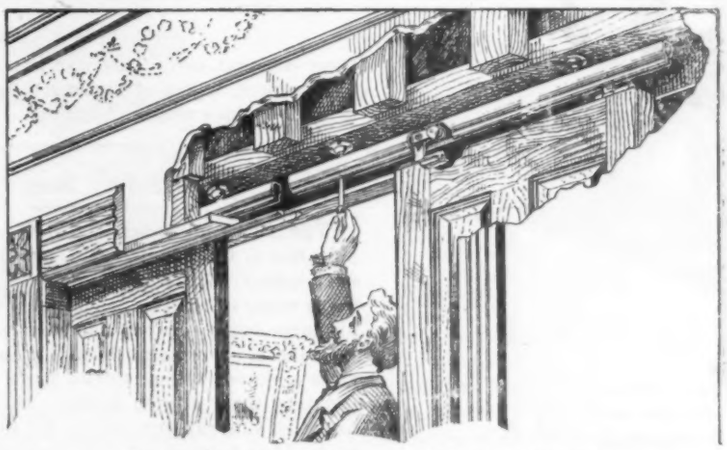


Fig. 3.—Hanger in Position and Mode of Adjustment.

Snediker's Quick Adjusting Leg Vise.

National Vise & Tool Works, Camden, N. J., manufacturers of the Stephens vise, represented by Tower & Lyon, 95 Chambers street, New York, have recently put

Fig 1.—Blacksmiths Quick Adjusting Leg Vise, Closed.

on the market Snediker's patent quick adjusting blacksmiths' leg vise, as illustrated in Figs. 1 and 2. Our attention is drawn to the fact that improvements in vises for

Fig 2.—Vise Open.

years have been confined principally to those of the parallel pattern. The feature of this vise is that all the advantages of the quick acting bench vises are embodied in this simple and practical leg vise. There is a ratchet on the back of the vise by means of which a quick adjustment is made, there being no weakening of the vise jaws by borings to admit the tightening screw. The metal is so distributed as to reinforce the parts subjected to the greatest strain, and the material used is carefully designed with reference to rigidity and the prevention of any tendency to bend. Fig. 1 shows the vise closed; Fig. 2 representing it open. When necessary to secure a piece of work between the jaws the outer jaw is with a slight push forced back so that the bolt passing through the strap to which the lever is attached catches in one of the ratchets, when a part turn of the lever will secure it firmly. Work can be as easily released by slightly reversing the lever and pushing the lower end of it forward, thus disengaging the strap bolt and causing the outer jaw to fall outward. With this method of construction the jaws retain their normal strength and remain parallel instead of bending outward at the top from constant use. This vise is not sold by weight but by numbers, which are intended to indicate the sizes as heretofore known by weight.

Fig. 1.—Safety Step Ladder.

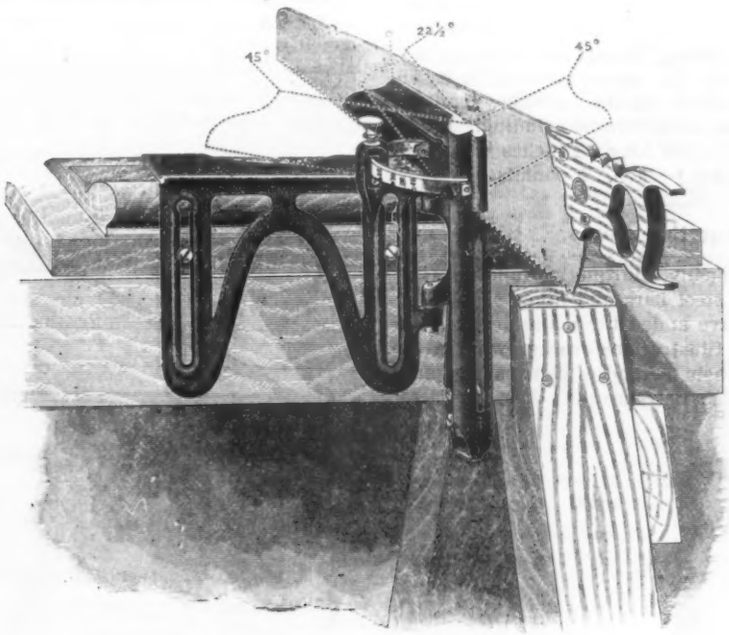
Fig 2.—Safety Ladder in Use.

The Safety Step Ladder.

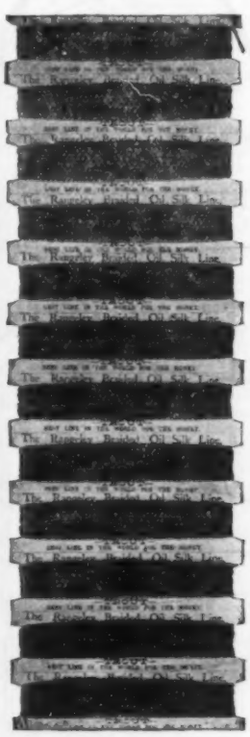
The American Juvenile Bed Company, 9 and 10 Wiggins Block, Cincinnati, Ohio, are introducing the safety step ladder illustrated herewith. It is referred to as being made of the best, thoroughly seasoned yellow pine, all parts being securely fastened with bolts and screws to make it strong and durable. In Fig. 1 the ladder is shown closed, taking up no more floor space than the ordinary form of step ladder. In Fig. 2 it is shown in use with side rails extending 2½ to 3 feet above the top step. It is pointed out that the rails make it easy for a person to ascend and descend, that they serve as a protection against falling, and that they make available 3 feet more of the ladder than can be safely used on an ordinary step ladder.

Improved Seavey Miter Box.

Thomson Bros. & Co., Lowell, Mass., for whom Smith & Hemenway Company, 296 Broadway, New York, are direct representatives, are manufacturing an improved form of the Seavey miter box, here illustrated. This is known as No. 159, Model 5. It is made entirely of iron and steel and can be folded up and easily carried in the pocket. No special saw is needed, it being usable with any ordinary hand saw or cross cut saw. The graduated circle, the adjustment of which makes possible the cutting of either a right or left miter of any angle, is accurately notched so that the miter when cut is true. The thumb screw holds the circle at any desired point and the two spring held saw clamps permit of no deviation in cutting, as is the case with wood miter boxes. Particular attention is drawn to the fact that with this miter box almost any molding of varying width or depth can be cut. When in the shop it can be held in a fixed position by means of two screws and as easily released by loosening the screws and dropping it so that it is free, leaving the screws in position. All the parts are interchangeable and it is made in only one size, weighing but 2 pounds.



Improved Seavey Miter Box



Rangeley Oil Silk Line.

Rangeley Oil Silk Line.

Clark, Horrocks & Co., Utica, N. Y., are putting on the market oil silk fish lines wound upon improved cards, as shown in the accompanying cut. The card is of heavy pasteboard with notches cut out along both edges. Each line contains 30 feet, and 1 dozen of these are wound on a card, connected with each other at the back, making a continuous line of 360 feet. The card is perforated, part way through, between each line, which permits as many feet of line to be sold as desired by the customer, and the card to be neatly broken off. The line is referred to as filling the want for a good silk line that can be retailed at the popular price of 10 cents.

The Pike Mower Knife and Tool Grinder.

The accompanying cut represents a mower knife and tool grinder offered by the Pike Mfg. Company, Pike Station, N. H. The main frame of the grinder is arched at the top and ribbed together at the base, and is referred to by the makers as being strong in construction, preventing the machine getting out of true by the warping of the base board. It is pointed out that the knife holder is strong and simple in operation, handling any knife now in use; also that the grinder preserves the

The Pike Mower Knife and Tool Grinder

original bevel of mower knives, giving a sharp, perfectly true edge from heel to toe. The emery wheel can be shifted from the oscillating movement to the stationary, or *vice versa*, instantly by lowering or raising a lever. It is claimed that the machine grinds fast and runs easily, grinding a set of mower knives in ten minutes, and that the emery wheel cannot heat the knife and draw the temper. The grinder is alluded to as having comparatively few parts. The emery wheels, it is remarked, are of the highest quality and they can be quickly changed for either sickle or tool grinding. When set up the grinder is 15 inches long, 12 inches wide and 10 inches high, and weighs, packed, 25 pounds.

Indestructible Posts.

The Inland Steel Company, Marquette Building, Chicago, manufacturers of steel bars and other shapes, at Chicago Heights, Ill., have added the manufacture of a full line of steel posts. Illustrations are herewith given of these posts showing their method of construction and some of the uses to which they are put. The complete

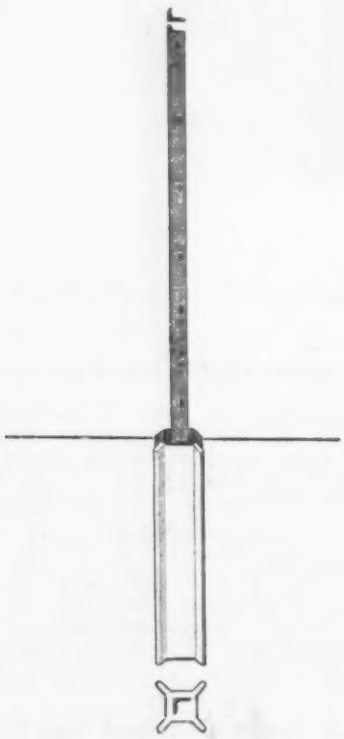


Fig. 1.—Indestructible Posts.

post, as regularly made, consists of a base of burned and vitrified fire clay of great toughness, glazed so that it cannot be affected by moisture and frost, with an upright of high carbon angle steel of proper hight and strength. The upright is punched with any desired number of holes to receive the ordinary fence staple which holds the wire on the outside and clinches on the inside. The steel upright is set rigidly and permanently in the center of the base with Portland cement and is coated with asphaltum preservative paint. The materials used in the construction of these posts, it is remarked, are by their nature indestructible. Contact with water or earth will not destroy nor injure the clay base, it is stated, also that fire or frost will not affect it. The exposed part of the steel upright sets above the ground and, it is claimed, will not rot, burn, or rust. Fig. 1 is an illustration of the standard line fence post with a base 30 inches high and an upright 52 inches high above the base. The sectional views above and below the post show the shapes of the angle steel and of the clay base. Fig. 2 illustrates a standard end fence post which has a bottom plate 14 x 14 inches, and makes a very rigid post. Fig. 3 is an illustration of the adaptation of these posts to the construction of grape arbors and other similar uses. The company also manufacture these posts in ornamental forms for lawns, parks, &c., hitching posts, street corner posts with signs bearing the names of the streets if wanted, and railroad posts with signs to carry such names or designations as may be desired. It

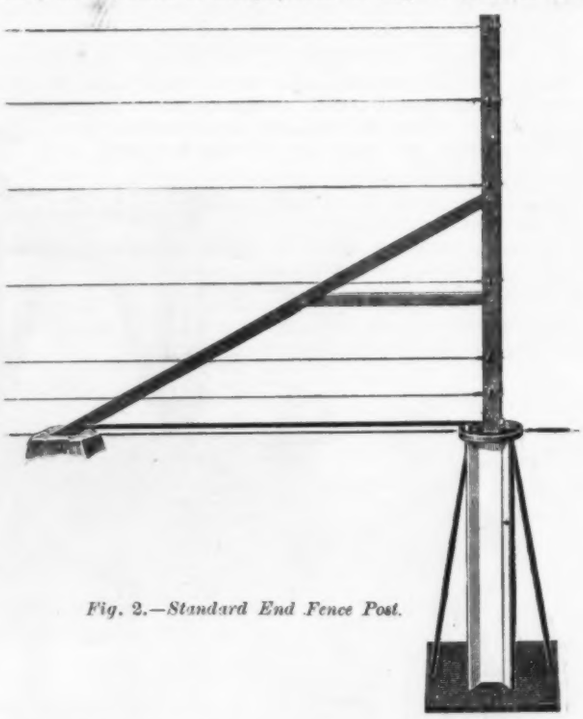


Fig. 2.—Standard End Fence Post.

is stated that the posts are so low in price that they will compete with wooden posts, to which they are preferable by reason of their indestructibility. The company's capacity for production is referred to by them as prac-

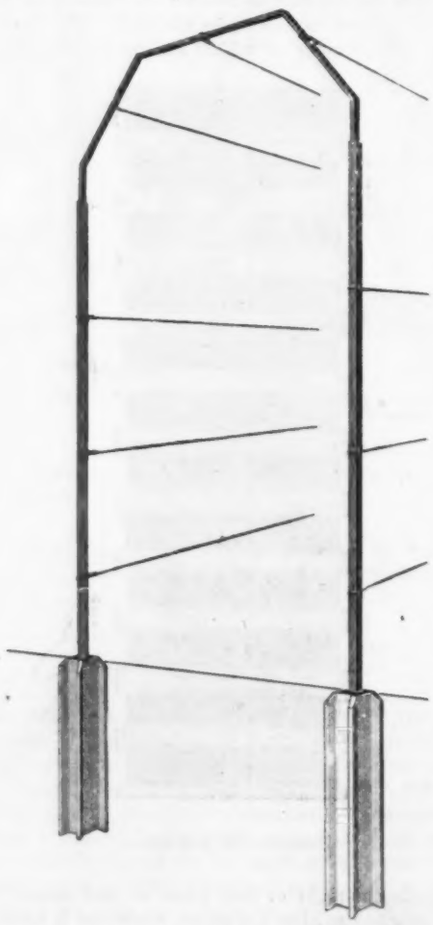


Fig. 3.—Adaptation of Posts to Grape Arbor.

tically unlimited. Catalogues and price lists have been issued by the company, which will be furnished on application.

Current Hardware Prices.

REVISED DECEMBER 31, 1900.

General Goods.—In the following quotations General Goods—that is, those which are made by more than one manufacturer, are printed in *Italics*, and the prices named represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. They apply to such quantities of goods as are usually purchased by retail merchants. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

Special Goods.—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

Range of Prices.—A range of prices is indicated by means of the symbol @. Thus 33⅓@33⅓&10% signifies that the price of the goods in question ranges from 33⅓ per cent. discount to 33⅓ and 10 per cent. discount.

Cut Prices.—*In the present condition of the market there is a good deal of cutting of prices by the jobbing trade, whose quotations are often lower than those of the manufacturers.*

Names of Manufacturers.—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE INDEX SUPPLEMENT (May 3, 1900), which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

Standard Lists.—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

Additions and Corrections.—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

Adjusters Blind—
Domestic, ₩ doz. $3.00....33⅓@33⅓&10%
North's....10%
Zimmerman's—See *Fasteners, Blind.*

Window Stop—
Ives' Patent....25&5%
Tapiin's Perfection....50%

Ammunition—See *Caps, Cartridges, Shells, &c.*

Anvils—American—
Eagle Anvils....₩ lb 7¼@7¾¢
Hay-Budden, Wrought....9@9½¢
Horseshoe brand, Wrought....9½@9¾¢
Samson....₩ lb 7½@8¢
Trenton, Wrought....₩ lb 8½@8¾¢
Buel Pat. Trenton Wrought, ₩ lb 9@9½¢
Vulcan Wrought....₩ lb 8@8½¢

Imported—
Armitage's Mouse Hole....8¾@9¼¢
Peter Wright's....9½@9¾¢

Anvil, Vise and Drill—
Millers Falls Co., $18.00....20%

Apple Parers—See *Parers, Apple, &c.*

Aprons, Blacksmiths'—
Hull & Hoyt Co.:
Lots of 1 doz....25%
Smaller Lots....20%
Lots of 3 doz....30%

Augers and Bits—
Com. Double Spur....70@70&5%
Boring Machine Augers....60&10&10@70&5%
Car Bits, 12-in. twist....60@...%
Jennings' Pattern:
Auger Bits....60@...%
Ford's Auger and Car Bits....40&10@40&10&10%
Forstner Pat. Auger Bits....25%
C. E. Jennings & Co.:
No. 10 ext. lip. R. Jennings' list....40%
No. 30. R. Jennings' List....50%
Russell Jennings'....25&10&2½%
L'Hommedieu Car Bits 15&10@15&10&5%
Pugh's Black....20%
Pugh's Jennings' Pattern....35%
Snell's Auger Bits....60%
Snell's Bell Hangers' Bits....50%
Snell's Car Bits, 12-in. twist....60%
Wright's Jennings Bits (R. Jennings' list)....50%

Bit Stock Drills—
Standard List....65&5@70%

Expansive Bits—
Clark's small, $18; large, $26....50&10%
Lavigne's Clark's Pattern, No. 1, ₩ doz., $26; No. 2, $18....50&10%
C. E. Jennings & Co., Steer's Pat....33⅓%
Swan's....60%

Gimlet Bits—
Common Double Cut..gro. $2.00@2.75
German Pattern....gro. $3.25@5.00
Double Cut, makers' lists....50¢&5@50&10%

Hollow Augers—
Ames....25&10%
Bonney's Adjustable, ₩ doz....$15.55
New Patent....25&10%
Universal....20%

Ship Augers and Bits—
Ford's....40%
Snell's....40%
C. E. Jennings & Co.:
L'Hommedieu's....15&10%
Watrous'....40%

Awl Hafts, See *Hafts, Awl.*

Awls—
Brad Awls:
Handled....gro. $2.75@3.10
Unhandled, Shouldered..gro. 65@66c
Unhandled, Patent....gro. 66@70c
Peg Awls:
Unhandled, Patent....gro. 31@34c
Unhandled, Shouldered..gro. 65@70c
Scratch Awls:
Handled, Common..gro. $3.50@4.00
Handled, Socket..gro. $11.50@12.00

Awl and Tool Sets—See *Sets, Awl and Tool.*

Axes—
First Quality, best brands $6.25@6.50
First Quality, other brands $6.00@6.25
Jobbers' Special Brands:
Good Quality....$5.00@5.50
Best Quality....$6.25
Cheap, Handled Axes....$5.50@5.75
Beveled, add 25c doz.

Axle Grease—See *Grease, Axle.*

Axles—Iron or Steel.
Concord, Loose Collar....4½c
Concord, Solid Collar....5 c
No. 1 Common....5@5½c
No. 1½ Com. New Style....5¼@4 c
No. 2, Solid Collar....5¾@4 c
Nos. 7, 8, 11 to 14....75&10%
Nos. 15 to 18....60&10%
Nos. 19 to 22....75@75&10%
5% cash 10 days.

Boxes, Axle—
Common and Concord, not turned..lb. 5c
Common and Concord, turned..lb. 6c
Half Patent....lb. 9c

Balances—Sash—
Caldwell new list....50&
Pullman's....60%

Spring—
Spring Balances....50@50&10%
Chatillon's Light Spg. Balances....40&10%
Chatillon Straight Balances....40%
Chatillon Circular Balances....50%
Chatillon's Large Dial....30%
Pelouze....50%

Barb Wire—See *Wire, Barb.*

Bars—Crow—
Steel Crowbars, 10 to 50 lb., per lb..5@5¼c

Beams, Scale—
Scale Beams, List Jan. 12, '82..30&10%
Chattillon's No. 1....30%
Chattillon's No. 2....40%

Beaters—Egg—
Standard Co.:
No. 5 Steel Handle Dover, ₩ gro. $6.50
No. 10 Cast Handle Dover, ₩ gro. $8.00
No. 10 Steel Handle Dover, ₩ gro $8 00
No. 15 Extra Heavy Steel Handle, ₩ gro. $15.00
Rival, ₩ gro....$10.00
Tapiin Mfg. Co.: ₩ gro.
No. 50 Small Family size....$6.50
No. 100 Regular Family size....$8.00
No. 102 Regular Family size, tinned....$9.50
No. 150 Large Family size....$15.00
No. 152 Large Family size, tinned....$17.00
Lyon's, Standard size....₩ doz. $1.75
Wonder (S. S. & Co.)....₩ gro. $7.50

Bellows—
Blacksmith, Standard List..70@70&10%
C. E. Jennings & Co.. Blacksmith..60&10%
C. E. Jennings & Co., Hand....33⅓%

Blacksmiths—
Inch.. 9 10 11 12 14 16
Each..$3.70 3.95 4.55 5.10 5.70 6.55
Extra Length:
Each..$4.25 4.85 5.40 5.95 6.80 7.95

Molders—
Inch.. 9 10 11 12 14 16
Doz...$6.75 7.25 8.50 9.50 12.00 14.50

Hand—
Inch... 6 7 8 9 10 12
Doz....$3.75 4.25 4.50 5.00 5.75 6.75
Net Prices.

Bells—Cow—
Ordinary goods....75&5@75&10%
High grade....70@70&10%
Jersey....75&10%
Texas Star....50&10%

Door—
Abbe's Gong....45%
Barton Gong....55%
Gong, Yankee....55%
Home, R. & E. Mfg. Co.'s....55&10%
Lever and Pull, Sargent's....20&10&10%

Hand—
Hand Bells, Polished....60@50&10%
White Metal....55@55&10%
Nickel Plated....50@50&10%
Swiss....60%
Silver Chime....35½@35¾&10%

Miscellaneous—
Farm Bells....lb. 2@3½c
Steel Alloy Church and School....50&10&5@50%
Wilmot & Hobbs Mfg. Co., Gongs....70%

Belting—Rubber—
Common Standard....75@75&10%
Standard....70@70&10%
Extra....60&10&5%
High Grade....60&10@50&10&5%
Boston Belting Co.:
Seamless Stitched, Imperial....45%
Boston....50&5%
Niagara....50&5%

Leather—
Extra Heavy, Short Lap...50&10@50%
Regular Short Lap 60&10@60&10&5%
Standard....60&10&10@70&5%
Light Standard....70@70&10%

Cotton—
Rossendale-Reddaway B. & H. Co.:
Sphinx Brand....60&10%
Durable Brand....70%

Bench Stops—See *Stops, Bench*

Benders and Upsetters, Tire—
Green River Tire Benders and Upsetters....20%
Stoddard's Lightning Tire Upsetters....40@50%

Bicycle Goods—
John S. Leng's Son's 1899 list:
Chains....50%
Parts....50%
Spokes....50%
Tubes....60%

Bits—
Auger, Gimlet, Bit Stock Drills, &c.—See *Augers and Bits.*

Bit Holders—See *Holders.*

Blind Adjusters—See *Adjusters, Blind.*

Blind Fasteners—See *Fasteners, Blind.*

Blind Staples—See *Staples, Blind.*

Blocks—Tackle—
Common Wooden....70@70&10%
Cleveland Steel....50&10@60&10%
Eddy's Steel....60&10%
Hartz Steel....50&10%
Ford's Star Brand Self Lubricating....60&10%
Hollow Steel, Ford's Pat. Star Brand....50&10%
Lane's Patent Automatic Lock and Junior....30%
Stowell's Novelty, Mal. Iron....50%
See also *Machines, Hoisting.*

Boards, Stove—
Zinc, Crystal, &c....50&10%

Bolts—
Carriage, Machine &c.—
Common, list Jan. 30, '95..70&10&2½@...%
Norway Iron, $3.00, list Oct. 7, '84..75@75&10%
Phila. Eagle, $3.00 list May 25, '99....80@80&10%
Bolt Ends, list Jan. 30, '95....70&10&2½@...%
Machine, list Oct. 1, '99..70&10&2½@...%
NOTE—*The rapid advances in manufacturers' prices enable the jobbers to cut prices freely.*

Door and Shutter—
Cast Iron Barrel, Round Brass Knob:
Inch.... 3 4 5 6 8
Per doz...$0.33 .36 .45 .57 .80
Cast Iron Spring Foot:
Inch.... 6 8 10
Per doz.... $1.00 1.25 1.75
Cast Iron Chain, Flat, Japanned:
Inch.... 6 8 10
Per doz.... $0.85 1.20 1.50
Cast Iron Shutter, Brass Knobs:
Inch.... 6 8 10
Per doz.... $0.60 .90 1.15
Wrought Barrel Brass Knob:
Inch.... 3 4 5 6 8
Per doz ...$0.44 .50 .61 .70 1.23
Wrought Barrel....70&10@75&5%
Wrought " Bronzed..40&5@50&10%
Wrought Flush, B. K..50&10@60&10%
Wrought Shutter...40&10&10@60&5%
Wrought Square Neck....50@50&10%
Wrought Sunk....50@50&10%
Ives' Patent Door....60%

Stove and Plow—
Plow....60&10@...%
Stove....67½%

Tire—
Common....70@70&5%
American Screw Company:
Norway Phila., list Oct. 16, '84....75%
Eagle Phila., list Oct. 16, '84....77½%
Bay State, list Dec. 28, '99....70%
Franklin Moore Co.:
Norway Phila., list Oct. 16, '84....75%
Eagle Phila., list Oct. 16, '84....77½%
Eclipse, list Dec. 28, '99....70%
Port Chester Bolt & Nut Company
Empire, list Dec. 28, '99....70%
Keystone Phila. list Oct. '84....77½%
Norway Phila., list Oct. '84....75%

Borers, Tap—
Borers Tap, Ring, with Handle:
Inch.... 1¼ 1½ 1¾ 2
Per doz... $3.50 4.50 5.00 6.50
Inch.... 2¼ 2¾
Per Doz.... $7.50 10.50
Enterprise Mfg. Co., No. 1, $1.25; No. 2, $1.65; No. 3, $2.50 each....25@30%

Boring Machines—See *Machines, Boring.*

Boxes Mitre—
C. E. Jennings & Co....60%
Seavey's, per doz., $30....40%

Braces—
NOTE.—*Most Braces are sold at net prices.*
Common Ball, American...$1.15@1.35
Barber's....50&10&10@50&10%
Fray's Genuine Spofford's....50%
Fray's No. 70 to 120, 81 to 113, 207 to 414....60%
C. E. Jennings & Co....50&10%
P., S. & W. Co., Peck's Patent 50&10@50%

Brackets—
Wrought Steel....70&10@75&5%
Bradley's Wire Shelf:
Full cases....50%
Broken cases....75&10%
Griffin's Pressed Steel....75&10%
Griffin's Folding Brackets....70&10%

Bright Wire Goods—See *Wire and Wire Goods.*

Broilers—
Wire Goods Co....70@70&10%

Buckets, Well and Fire—See *Pails*

Bucks, Saw—
Hoosier....₩ gro. $24.00

Bull Rings—See *Rings, Bull.*

Butts—Brass—
Wrought list Sept., '96..25&10@35&2½%
Cast Brass, Tiebout's....50%

Cast Iron—
Fast Joint, Broad....50@...%
Fast Joint, Narrow....50@...%
NOTE.—*Jobbers often sell the following at 70&5%:*
Loose Joint....66⅔&5@70%
Loose Pin....66⅔&5@70%
Mayer's Hinges....66⅔&5@70%
Parliament Butts....66⅔&5@70%

Wrought Steel—
Loose Joint, Table and Back Flaps, Narrow and Broad, Inside Blind, Loose Pin, Loose Pin, Ball and Steeple Tip....75@75&10%
Bronzed Wrt, Nar. and Inside Blind Butts....60@10@50&10&5%

Cages, Bird—
Hendryx, Brass:
300, 500, 1100 series....35%
1200 series....35&10%
200, 300, 600 and 900 series....40&10%
Hendryx Bronze:
700, 800 series....40&10%
Hendryx Enameled....40&10%

Calipers—See *Compasses.*

Calks, Toe and Heel—
Blunt 1 prong....per lb. 3¼@4c
Sharp, 1 prong....per lb. 4¼@4½c
Perkins' Bluet....₩ 5 c
Perkins' Sharp....₩ 5½c

Can Openers—See *Openers, Can.*

Cans, Milk—
	5	8	10 gal.	
Illinois Pattern.	$1 75	2.10	2.25	each.
Iowa Pattern....	....	2.40	2.60	each.
Buffalo Pattern.	....	2.80	2.50	each.
	20	30	40	qts.
New York Patt'rn	3.00	3.25	3.40	each.
Baltimore Patt'rn	2.50	2.85	3.10	each.

Cans, Oil—
Galvanized Blue Band, 1-gal., ₩ doz. $1.60@$1.75
Buffalo Family O.I Cans:
3	5	10 gal.
$48.00	60.00	108 gro.
Glass Oil....₩ doz. $1.90@$2.20

Caps—Percussion—
Eley's E. B....50c
G. D....per M 32@34c
F. L....per M 37@40c
G. E....per M 47@50c
Musket....per M 57@60c

Primers—
Berdan Primers, $1.00....5%
B. L. Caps (Sturtevant Shells) $1.00....5%
All other primers....$1.10@$1.25

Carpet Stretchers—
See *Stretchers, Carpet.*

Cartridges—
B. B. Caps, Con., Ball Swgd.....$1.90
B. B. Caps, Round Ball... $1.12@1.18
Blank Cartridges:
22 C. F., $5 50.....10@5%
38 C. F., $7 00.....10@5%
22 cal, Rim, $1.50.....10@5%
32 cal. Rim, $2.75.....10@5%
Central Fire.....25%
Pistol and Rifle.....15@5%
Primed Shells and Bullets.....15@5%
Rim Fire Sporting.....50%
Rim Fire, Military.....15@5%

Casters—
Bed.....70@70@10%
Plate.....75@75@5%
Philadelphia.....75@75@10%
Bees.....70@10%
Boss Anti-Friction.....70@10%
Martin's Patent (Phœnix).....45%
Payson's Anti-Friction Furniture.70@10%
Payson's Anti-Friction Truck....70@10%
Standard Ball Bearing.....45%
Tucker's Patent, low list.....30%

Cattle Leaders—
See *Leaders, Cattle.*

Chain—
American Coil, Full Casks:

3-16	*¼*	*5-16*	*⅜*	*7-16*	*½*	*9-16*
7.25	*5.35*	*4.35*	*3.50*	*3.35*	*3.25*	*3.15*
⅝	*¾*	*⅞ to 1¼ inch.*				
3.10	*3.05*	*3.00 cents per lb.*				

Less than Cask lots add 40c per 100 lbs.
German Coil, list July 24, '97.60&10@10%
German Halter Chain, list July 24, '97.....60&10@10%
Traces, Western Standard: 100 pair
6¼—6-3, Straight, with ring...$26.00
6¼—6-2, Straight, with ring.. $27.00
6¼—8-3, Straight, with ring.. $31.00
6¼—10-2, Straight, with ring..$35.00
Add 2¢ per pair for Hooks.
Twist Traces 2¢ per pair higher than Straight Link.
Trace, Wagon and Fancy Chains, list April, '98.....50@10@60%
Jack Chain, list July 10, '93:
Iron.....60@60@10%
Brass.....60@60@10%
Safety Chain.....70@70@10%
Cal. Pump Chain.....lb 4½@4¾c
Covert Sad. Works:
Breast, Hitching and Rein Chains..50%
Covert Mfg. Co.:
Breast.....35&2%
Halter.....35&2%
Heel.....35&2%
Rein.....35&2%
Stallion.....35&2%
Oneida Community:
Eureka Coil and Halter.....60@60&5%
Niagara Coil and Halters....60@60&5%
Niagara Cow Ties.....45&5@45&10&5%
Am. Coil and Halters....50&10&5@60%
Am. Cow Ties.....35&5@40&5%
Wire Goods Co.:
Dog Chain.....60%
Universal Dbl-Jointed Chain.....45%

Chalk—(From Jobbers.)
Carpenters', Blue.....gro. 45c
Carpenters', Red.....gro. 40c
Carpenters', White.....gro. 35c
See also Crayons.

Chalk Lines—See *Lines.*

Checks, Door—
Bardsley's.....40&10%
Columbia.....50&10%
Eclipse.....60@60&10%

Chests, Tool—
American Tool Chest Co.:
Boys' Chests, with Tools.....53%
Youths' Chests, with Tools.....40%
Gentlemens' Chests, with Tools..30%
Farmers', Carpenters', etc, Chests, with Tools.....30%
Machinists' and Pipe Fitters' Chests, Empty.....50%
C. E. Jennings & Co.'s Machinists' Tool Chests.....25@25&10%

Chisels—
Socket Framing and Firmer
Standard List.....70@10@...%
Buck Bros.....30%
Charles Buck.....30%
C. E. Jennings & Co. Socket Firmer No. 10.....60&10%
C. E. Jennings & Co. Socket Framing No. 15.....60&10%
Swan's.....70&5%
L. & I. J. White.....30@30&5%

Tanged—
Tanged Firmers.....40@5@40&10%
Buck Bros.....30%
Charles Buck.....30%
C. E. Jennings & Co Nos. 191, 181....25%
L. & I. J. White, Tanged.....25&5%

Cold—
Cold Chisels, good quality.lb. 14@16c
Cold Chisels, fair quality.....lb. 12c
Cold Chisels, ordinary.....lb. 8@9c

Chucks—
Beach Pat., each $8.00.....30%
Skinner Patent Chucks:
Combination Lathe Chucks.....40%
Drill Chucks, Patent and Standard..30%
Drill Chucks, New Model.....2½
Independent Lathe Chucks.....40%
Improved Planer Chucks.....20%
Universal Lathe Chucks.....40%
Face Plate Jaws.....35%
Standard Tool Co.:
Improved Drill Chuck.....45%
Union Mfg. Co.:
Combination.....40%
Czar Drill.....30%
Geared Scroll.....30%
Independent.....40%
Union Drill.....30%
Universal.....40%
Face Plate Jaws.....35%

Clamps—
Adjustable, Hammers'.....20@20&5%
Adjustable, Stearns'.....30%
Cabinet, Sargent's.....50&10%
Carriage Makers', P., S. & W. Co. 40&10%
Carriage Makers' Sargent's.....50&10%
Desty, Parallel.....33½&10%
Lineman's, Utica Drop Forge & Tool Co.....40%
Saw Clamps, see *Vises, Saw Filers'.*

Cleaners Walk—
Star Socket, All Steel....₱ doz. $4.00 net
Star Shank, All Steel....₱ doz. $3.75 net
W. & C. Shank, All Steel, 7½ in. ₱ doz., $3.35; 8 in., $3.40; 8½ in., $3.50.

Cleavers, Butchers'—
Foster Bros.....30%
New Haven Edge Tool Co.'s.....40&10%
Nichols Bros., Flat hdl., 30%; Rd. hdl., 40%
Fayette R. Plumb.....33⅓@33⅓&10%
P., S & W.....33⅓&5@33⅓&10%
L. & I. J. White.....25%

Clippers—
Chicago Flexible Shaft Company:
Handy Toilet.....₱ doz. $7.20
Mascotte Toilet.....₱ doz. $3.40
Monitor Toilet.....₱ doz. $9.00
Stewart's Patent.....₱ doz. $10.00

Clips, Axle—
Eagle and Superior ¼ and 5-16 inch.....70@10%
Norway, ¼ and 5-16 inch..70@7 @10%

Cloth and Netting, Wire
—*See Wire, &c.*

Cocks, Brass—
Hardware' list (Globe, Kerosene, Lever Bibbs, Racking, &c.).....70@5@70@10%

Coffee Mills—See *Mills, Coffee.*

Collars Dog—
Brass, Pope & Stevens' list.....40%
Embossed, Gill, Pope & Stevens' list30&10%
Leather Pope & Stevens' list.....40%

Compasses Dividers, &c.
Ordinary Goods.....70@10@75%
Bemis & Call Hdw. & Tool Co.:
Dividers.....65%
Calipers, Call's Patent Inside.....55%
Calipers, Double.....65%
Calipers, Inside or Outside.....65%
Calipers, Wing.....60%
Compasses.....50%
J. Stevens A. & T. Co.....25&10%

Conductor Pipe, Galvanized—
Factory Shipments to Jobbers:

Territory.	*Carload. Loose.*	*L. C. L. Nested.*
Eastern....	*75@10%*	*75@5%*
Central....	*75@7½%*	*75@2½%*
Southern..	*75@5%*	*75%*
S. Western.	*75%*	*70@10@2½%*

Terms, 2% for cash.
See also *Eave Trough and Elbows*

Coolers, Water—

Nos.	2	3	4	6
Labrador	$11.50	$14.00	$17.50	$20.00
8 gal.	$24.00			
Nos	3	4	6	8
Iceland..	$23.00	$25.00	$30.00	$37.50
10	14 gal. $57.00	$72.00		

Coopers' Tools—
See *Tools, Coopers'.*

Cord— Sash—
Braided, Drab.....lb. 25c
Braided, White, Common, lb 17½@18c
Cable Laid Italian..lb. A, 18c; B, 16c
Common India.....lb 9 @9½c
Cotton Sash Cord, Twisted....13@16c
Patent Russia.....lb. 13½@13c
Cable Laid Russia.....lb. 13½@14c
India Hemp, Braided.....lb 14@15c
India Hemp.....lb. 10@12c
Patent India.....lb. 10@12c
Pearl Braided, cotton.....₱ ᵬ 17@18¢
Massachusetts, White.....₱ ᵬ 22½¢
Massachusetts, D ab.....₱ ᵬ 26½¢
Eddystone Braided Cotton.....₱ ᵬ 19¢
Harmony Cable Laid Italian.....₱ ᵬ 18¢
Ossawan Mills:
Crown, Solid Braided White...₱ ᵬ 18¢
Braided, Giant, White.....₱ ᵬ 17¢
Peerless:
Cable Laid Italian.....16¢
Cable Laid Russian.....14¢
Cable Laid India.....15¢
Braided India.....18¢
Phœnix, White.....19¢
Samson:
Braided, Drab Cotton.....₱ ᵬ 32½¢
Braided, Italian Hemp.....₱ ᵬ 32½¢
Braided, Linen.....₱ ᵬ 40¢
Braided, White Cotton, Spot.₱ ᵬ 28½¢
Silver Lake:
A quality, Drab, 40¢.....15%
A quality, White, 35¢.....15%
B quality, Drab, 35¢.....15%
B quality, White, 30¢.....15%
Italian Hemp, 40¢.....15%
Linen, 57½¢.....15%

Wire, Picture—
Braided or Twisted,
See *Trade Report.*

Corn Knives and Cutters
—See *Knives, Corn.*

Corn Planters—
See *Planters, Corn—*

Crackers, Nut—
Little Giant.....₱ gr. $24.00

Cradles—
Grain.....50%

Crayons—
White Round Crayons, gross.5½@6c
Cases, 100 gro., $5.00, at factory.
D. M. Steward Mfg. Co.
Metal Workers' Crayons, gr. $2.50
Soapstone Pencils, round, flat or square.....gr. $1.50
Rolling Mill Crayons.....gr. $2.50
Railroad Crayons (composition) gr. $2.00
Case lots 20%
See also *Chalk.*

Creamery Pails—See *Pails, Creamery.*

Crooks, Shepherds'—
Fort Madison, Heavy.....₱ doz. $7.00
Fort Madison, Light.....₱ doz. $6.50

Crow Bars—See *Bars, Crow.*

Cultivators—
Victor Garden.....₱ doz. $10.00

Cutters—Glass—
Smith & Hemingway Co.....80%

Meat—
Hale's..Nos. 11 & 111 12 & 112 13 & 113
Per doz.. $10.80 13 20 18.00
American.....30%

Nos.	1	2	3	4	5
Each	$5	$7	$10	$25	$50	$60
Connecticut					
No.	0	1	8	10	12
Each..	$1.75	2.25	3.00	3.00	3.50

Enterprise.....25@25&7½%

Nos.	5	10	12	22	32
Each	$2	$3	$2.50	$4	$6

Dixon's, ₱ doz.....33⅓&10%

Nos.	1	2	3	4
	$14.00	$17.00	$19.00	$30.00

Home No. 1, ₱ doz. $22.75.....50&10%
Little Giant, ₱ doz.....33⅓@33⅓&5%

Nos.	305	310	312	320	322
	$35.00	$48.00	$44.00	$74.00	$68.00

Sterling.....33⅓&5%

Nos	1	2
Each	$5.00	$2.50

Miles' Challenge, ₱ doz.....45@45&10%

Nos.	1	2	3
	$22.00	$30.00	$40.00

New Triumph No. 605, ₱ doz. $24.00..
.....33⅓&5%
Woodruff's, ₱ doz.....40%

Nos.	100	150
	$15.00	$18.00

Chadborn's Smoked Beef Cutter, ₱ doz. $60.00
Enterprise Beef Shavers.....95@30%

Slaw and Kraut—
Henry Disston & Sons:
Slaw, Corn Grater, &c.....40%
Kraut Cutters 24 x 7, 26 x 8, 30 x 9.55%
Kraut Cutters 36 x 12, 40 x 12.....40%
Tucker & Dorsey Mfg. Co.:
Kraut Cutters.....40%
Slaw Cutters, 1 Knife, ₱ gr....$18@$20
Slaw Cutters, 2 Knife, ₱ gr....$22@$36

Tobacco—
All Iron, Cheap.....doz. $4.25@$4.50
Enterprise.....25@30%
National, ₱ doz. $21.00.....40%
Sargent's, ₱ doz. $24.00.....45&10%

Washer—
Appleton's, ₱ doz. $16.00.....
.....50&10&10%
Bonney's.....₱ doz. $4.75

Diggers, Post Hole, &c.—
Dalbey Post Hole Auger..per doz. $10.00
Iwan's Improved Post Hole Auger....40%
Iwan's Perfection Post Hole Digger...
₱ doz. $9.00
Kohler's Universal.....₱ doz. $14.00
Kohler's Little Giant.....₱ doz. $15.00
Kohler's Hercules.....₱ doz. $12.00
Kohler's Invincible.....₱ doz. $10 00
Kohler's Rival.....₱ doz. $9.00
Kohler's Pioneer.....₱ doz. $8.00
Never-Break Post Hole Diggers, ₱ doz. $24.00.....60%
Samson, ₱ doz. $34.00.....25%

Dividers—See *Compasses.*

Dog Collars—See *Collars, Dog.*

Door Checks—
See *Checks, Door.*

Door Springs—
See *Springs, Door.*

Drawers, Money—
Tucker's Pat. Alarm Till No. 1, ₱ doz. $18; No. 2, $15 No. 3, $14; No. 4, $18.

Drawing Knives—
See *Knives, Drawing.*

Drills and Drill Stocks—
Common Blacksmiths' Drill..each $1.50@$1.75
Blacksmiths' Self-feeding....each $3.75@4.00
Bench Drills, Stearns'.....60%
Breast, Millers Falls, each $3.00..15&10%
Breast, P., S. & W.....30@30&10%
Goodell Automatic Drills..40&5@40&10%
Johnson's Automa ic Drills Nos. 2 and 3.....16⅔%
Johnson's Drill Points.....25&10%
Ratchet, Curtis & Curt's.....25%
Ratchet, Parker's.....40%
Ratchet, Weston's.....20@25%
Ratchet, Whitney's, P. S. & W...40&10%
Whitney's Hand Drill, No. 1, $10.00; Adjustable, No. 10, $12.00.....33⅓%

Twist Drills—
Standard List.....60@5@65@5%

Drill Bits or Bit Stock Drills—See *Augers and Bits.*

Drill Chucks—See *Chucks.*

Dripping Pans—
See *Pans, Dripping.*

Drivers, Screw—
Balsey's Screw Holder and Driver, ₱ doz. 2½-inch, $6; 4-in., $7.20 6-in., $9..40%
Buck Bros.....30%
Buck Bros' Screw Driver Bits.....27½%
Champion.....40&10%
Douglass Mfg. Co.....20@20&10%
Fray's Hol. H'dle Sets, No. 3, $12.00 50%
Gay & Parsons' Ratchet.....35%
Goodell's Automatic 50&10&10@50&10&10&5%
Mayhew's Black Handle.....50%
Mayhew's Monarch.....45&10%
New England Specialty Co.....50&10%
Sargent & Co.'s:
Nos. 1,50,55 and 60.....50&10&10%
Nos. 20 and 40.....64½&10%
Screw Driver Bits.....₱ doz. 50@70¢
Stanley's R. & L. Co.'s:
No. 64, Varnished Handles.....60&10%
No. 86.....70&10%
Swan's:
Nos. 65 to 68.....50%
No. 40.....40&10%
Nos. 25, 35 and 45.....20&10&10%

Eave Trough, Galvanized
Factory Shipments to Jobbers.

Territory.	*Carload.*	*L. C. L.*
Eastern.....	*80@10@5%*	*80@10%*
Central.....	*80@10@2½%*	*80@7½%*
Southern.....	*80@10%*	*80@5%*
S. Western...	*80@2½%*	*80%*

Terms, 2% for cash.
See also *Conductor Pipe.*

Egg Beaters—See *Beaters, Egg*

Egg Openers—
See *Openers, Egg.*

Elbows and Shoes—
Factory shipments to jobbers.....60@10@5%

Emery, Turkish—

	4 to 46	*54 to 150*	*Flour*
Kegs.....lb.	*4½c*	*5 c*	*3 c*
¼ Kegs....lb.	*5 c*	*5½c*	*3 c*
½ Kegs....lb.	*5 c*	*5½c*	*3½c*
10-lb cans, 10 in case.....	*6 c*	*6½c*	*4 c*
10-lb. cans, less than 10....	*10 c*	*10 c*	*8 c*

Enameled and Tinned Ware—See *Ware, Hollow.*

Escutcheon Pins—
See *Pins, Escutcheon.*

Extractors, Lemon Juice
—See *Squeezers, Lemon.*

Fasteners, Blind—
Zimmerman's.....50&10%

Faucets—
Cork Lined.....70@5@70@10@5%
Metallic Key, Leather Lined.....70@70@10%
Red Cedar.....50@50@5%
B. & L. B. Co.:
West's Lock, Open and Shut Key50&10%
John Sommer's Peerless Tin Key....40%
John Sommer's Boss Tin Key.....50%
John Sommer's Victor Metal Key.50&10%
John Sommer's Duplex Metal Key....60%
John Sommer's Diamond Lock.....40%
John Sommer's L. X. L. Cork Lined..50%
John Sommer's Reliable Cork Lined 50&10%
John Sommer's Common Cork Lined.70%
John Sommer's Chicago Cork Lined..60%
John Sommer's O. K. Cork Lined.....50%
John Sommer's Perfection Cedar.....40%
Star.....60@60&5%
Star, Metal Plug new list.....40@40&5%
Lockport, Metal Plug, reduced list.60&5%
McKenna, Brass:
Burglar Proof, N. P.....35%
Improved, ¾ and ⅞ inch.....35%
Self Measuring:
Enterprise, ₱ doz. $36.00.....40%
Lane's, ₱ doz. $36.00.....40&10%
National Measuring, ₱ doz. $36.00...40%

Felloe Plates—
See *Plates, Felloe.*

Files—Domestic—
List revised Nov. 1, 1899.

Best Brands	*70@75&5%*
Good Brands	*75&10@75&10@10%*
Fair Brands	*80@80@10%*
Second Quality	*80&10@80&25%*

Imported—
Stubs' Tapers, Stubs' list, July 24, '97.....25%

Fixtures, Grindstone—
Net Prices:

Inch....	*15*	*17*	*19*	*21*	*24*
Per doz.	*$2.90*	*3 10*	*3.30*	*3.80*	*4.60*

Stowell's Giant Grind stone Hanger.....
₱ doz. $6.00
Stowell's Grindstone Fixtures.....50%
P., S. & W. Co.....50&10&10%
Reading Hardware Co.....30&20&10%
Sargent's.....60&10&10%

Fluting Machines—
See *Machines, Fluting.*

Fodder Squeezers—
See *Squeezers, Fodder.*

Forks—
Sept. 1, 1900, list.
Grain or Barley Forks, 15 to 20 inches.....70@6%
Hay, 2 tine.....65%
Hay, 3 tine.....66⅔%
Hay, 4 tine, Header and Barley Forks, 13 to 16 inches.....66⅔%
Manure, 4 tine.....70%
Manure, 5 and 6 tine.....70%
Spading.....65%
Iowa Dig-Ezy Potato.....65%
Victor, Hay.....66⅔%
Victor, Manure.....70%
Victor, Header.....60&30%
Champion, Hay.....66⅔%
Champion, Manure.....70%
Columbia, Hay.....66⅔&5%
Columbia, Manure.....70%
Columbia, Spading.....70%
Hawkeye Wood Barley 4 tine ₱ doz. $5.00; 6 tine, $6.00.
W. & C. Potato Digger.....65%
Acme Hay.....60&20&7½%
Acme Manure.....60&25%
Dakota Header.....70&10&2½%
Jackson Steel Barley.....70&10&2½%
Kansas Header.....65&20%
W. & C. Favorite Wood Barley 4 tine, ₱ doz., $5.00; 5 tine, $6.00
Plated.—See *Spoons.*

Frames—
Saw—
Red, Polished and Varnished..doz. $1.15@$1.30
White.....doz. 75@80c

Screens and Frames—
See *Screens.*

Freezers, Ice Cream—

Qts...	*2*	*3*	*4*	*6*	*8*	*10*
Best..	*$1.50*	*1 60*	*1.85*	*2.50*	*3.00*	*3.90*
Good	*$1 25*	*1.35*	*1.70*	*2.05*	*2.65*	*3.50*
Fair..	*$1.00*	*1.10*	*1 50*	*1.75*	*2.30*	*2.90*

Fruit and Jelly Presses—
See *Presses, Fruit and Jelly.*

Fry Pans—See *Pans, Fry.*

Fuse—
Per 1000 Feet.

Hemp Fuse	*$2.60*
Cotton Fuse	*3.90*
Single Taped Fuse	*3.25*
Double Taped Fuse	*4.30*
Triple Taped Fuse	*5.00*

5% discount

Gates, Molasses and Oil—
Stebbins'.....80&10@80&10&10%

Gauges—
Marking, Mortise, &c.....55@10@55@10@10%
Barrett's Comb. Roller Gauge.....
₱ doz. $6.75@7.25
Stanley R. & L. Co.'s Butt & Babbet Gauge.....20&10%
Wire, Brown & Sharpe's.....25%
Wire, Morse's.....25%
Wire P., S. & W. Co.....10&10&5%

Gimlets—

Nail, Metal, Assorted ..... gro. $1.40@1.75
Spike, Metal, Assorted ..... gro. $3.00@3.50
Nail, Wood Handled, Assorted ..... gro. $4.00@4.25
Spike, Wood Handled, Assorted ..... gro. $5 00@5.25

Glass, American Window

Jobbers' List, Sept. 1, 1900.
Small lots from store:
Single Strength, all sizes ..... 85&25%
Double Strength, all sizes ..... 85&25&5%
10% to be added on all first quality, both Single and Double.

Glue—Liquid, Fish—

List A, Bottles or Cans, with Brush ..... 37½@50%
List B, Cans (¼ pts., pts., qts.) ..... 33⅓@48%
List C, Cans (¼ gal., gal.) ..... 25@45%

Glue Pots—See *Pots, Glue.*

Grease, Axle—

Common Grade ..... gro. $5.00@6.00
Dixon's Everlasting ..... 10-lb pails, ea. 85¢
Dixon's Everlasting, in bxs. ..... ₱ doz. 1 lb $1.20; 2 lb $2.00
Snow Flake:
1 qt. cans, per doz. $2.00; 2 qt., $3.20; 1 gal. cans per doz. $6.00; 3 gal. $16.00; 5 gal. $24.00 } 10%

Grindstone Fixtures—

See *Fixtures, Grindstone.*

Guards, Snow—

Cleveland Wire Spring Co.:
Galv. Steel ₱ 1000 ..... $9.00
Copper ₱ 1000 ..... $18.00

Gun Powder—See *Powder.*

Hack Saws—See *Saws.*

Hafts, Awl—

gro.
Peg Patent, Leather Top ..... $4.90@5.25
Peg Patent, Plain Top ..... $3.50@3.75
Sewing, Brass Ferrule ..... $1.50@1.60
Saddlers', Brass Ferrule ..... $1.35@1.45
Peg, Common ..... $1.25@1.35
Brad, Common ..... $1.50@1.75

Halters and Ties—

Covert Mfg. Co., Web ..... 45&2%
Covert Mfg. Co., Jute Rope ..... 45&2%
Covert Mfg. Co., Sisal Rope ..... 30&2%
Covert's Saddlery Works', 90 list, Web ..... 60&10%
Covert's Saddlery Works, Leather 60&10%
Covert's Saddlery Works, Jute ..... 60&5%
Covert's Saddlery Works, Sisal 60%
Covert's Saddlery Works, Manila ..... 60&5%
Covert's Saddlery Works, Cotton 70%

Hammer —

Handled Hammers—

Heller's Machinists' ..... 50@50&5%
Heller's Farriers ..... 50@50&5%
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50, $1.75 ..... 40&10%
Pecx, Stow & Wilcox ..... 40@40&5%
Fayette R. Plumb:
Plumb, A. E. Nail ..... 40@40&10%
Engineers' and B. S. Hand ..... 60&7½@60&10&7½%
Machinists' Hammers ..... 60&7½@60&10&7½%
Riveting and Tinners' ..... 50@50&10%
Sargent's C. S. New List ..... 45&10%

Heavy Hammers and Sledges—

3 lb. and under ..... lb. 45c
3 to 5 lb ..... lb. 36c } 30&5@30 &10%
Over 5 lb ..... lb. 30c
Wilkinson's Smiths' ..... 9½c@10c lb.

Handcuffs and Leg Irons

See *Police Goods.*

Handles—

Agricultural Tool Handles—

Hoe Rake, Fork, &c ..... 60@50&10%
Shovel, &c., Wood D Handle ..... 50@50&5%

Cross-Cut Saw Handles—

Atkins' ..... 40&5%
Champion ..... 45@45&10%
Disston's 50%

Mechanics' Tool Handles—

Auger, assorted ..... gro. $2.40@3 60
Auger, large ..... gro. $2.85@3.00
Brad Awl ..... gro. $1.25@1.50
Chisel Handles:
Apple Tanged Firmer, gro. ass'd. $2.25@2.35; *large, $2.50@2.60.*
Hickory Tanged Firmer, gro. ass'd. $1.75@2.20; *large, $2.50@2.70.*
Apple Socket Firmer, gro. ass'd, $1.70@1.85; *large, $2 00@2.25*
Hickory Socket Firmer, gro. ass'd, $1.60 @ $1.75; *large, $1.75 @ $2.00*
Hickory Socket Framing, gro. ass'd. $2.50@2.75; *large, $2.65@2.85*
File, assorted ..... gro. $1.60@1.15
Hammer, Hatchet, Axe, &c 60%
Hand Saw, Varnished, doz. 70@75c
Not Varnished ..... 50@60c
Plane Handles:
Jack, doz. 20@25c; Jack Bolted ..... 55@60c
Fore, doz. 25@33c; Fore, Bolted ..... 70@75c

Hangers—

Barn Door, New Pattern, Round Groove, Regular:

Inch	3	4	5	6	8
Doz	$0.85	1.30	1.60	1.95	2.15

Barn Door, New England Pattern, Check Back, Round Groove, Regular:

Inch	3	4	5	6
Doz	$1.45	1.90	2.55	3.10

Chicago Spring Butt Co.:
Friction 25%
Oscillating 25%
Big Twin 25%
Chisholm & Moore Mfg. Co.:
Baggage Car Door 50%
Elevator 40%
Railroad 55%
Coleman Hardware Mfg. Co.:
Czar Ball Bearing, ₱ doz. pair $7.50
No. 10 Roller Bearing, doz. pr. 5.50
No. 20 Roller Bearing, doz. pr. 4.50
Nickel 50%
J. G. C. ..... 50&10%
Cronk Hanger Co.:
Loose Axle 60%
Roller Bearing ..... 60&10%
Lane Bros.:
Parlor, Standard $3.25
Parlor, New Model $2.75
Barn Door, Standard ..... 60&10%
Covered ..... 50&10&10&5%
Special ..... 60&10%
Lawrence Bros.:
Advance 60%
Cleveland ..... 60&10%
Crown 60%
New York 60%
Peerless ..... 60&10%
Sterling 60%
McKinney Mfg. Co.:
No. 2, Standard, $18 ..... 60&10%
No. 1, Special, $13 ..... 60&10%
Stowell Mfg. and Foundry Co.:
Atlas 60%
Baggage Car Door 50%
Climax Anti-Friction 50%
Elevator 40%
Interstate ..... 50&10%
Magic 50%
Matchless 60%
Nansen ..... 60&10%
Parlor Door 50%
Railroad ..... 50&10%
Street Car Door ..... 50&10%
Steel, Nos. 300, 400, 500 ..... 40&15%
Zenith for Wood Track ..... 50&10%
Taylor & Boggs Foundry Co.:
Kidder's ..... 50&50&10%
Van Wagoner & Williams Hdw Co.:
American Trackless ..... 33⅓&10%
Wilcox Mfg. Co.:
Bike Roller Bearing ..... 60&10%
C. J. Roller Bearing ..... 60&10%
Cycle Ball Bearing 50%
Dwarf Ball Bearing 40%
Ives, Wood Track ..... 60&10%
L.T. Roller Bearing ..... 60&10&5%
New Era Roller Bearing ..... 50&10%
O. K. Roller Bearing ..... 60&10&5%
Prindle, Wood Track 60%
Richards' Wood Track 60%
Richards' Steel Track ..... 50&10%
Spencer Roller Bearing ..... 60&10%
Tandem Nos. 1 and 2 ..... 60%
Underwriters' Roller Bearing 40%
Wilcox Auditorium Ball Bearing 20%
Wilcox Barn Trolley No. 123 ..... 40%
Wilcox Fire Trolley, Roller Bearing 30%
Wilcox Le Roy Noiseless Ball Bearing 40%
Wilcox New Century ..... 50&10&10%
Wilcox Trolley Ball Bearing 40%

Extra 5&10% often given.

Harness Menders—See *Menders.*

Harness Snaps—See *Snaps.*

Hasps—

McKinney's Perfect Hasp ₱ doz. 10&10%
Wrought Hasps, Staples, &c.—See *Wrought Goods.*

Hatchets—

Best Brands ..... 40&10@50%
Cheaper Brands ..... 50&10@50&10&5%
Note.—Net prices often made.

Hay and Straw Knives—See *Knives.*

Hinges—

Blind and Shutter Hinges—

Surface Gravity Locking Blind:
(Victor; National; 1838 O. P.; Niagara; Clark's O. P.; Clark's Tip; Buffalo.)

No	1	3	5
Doz. pair	$0.75	1.45	2.90

Mortise Shutter:
(L. & P., O. S., Dixie, &c.)

No	1	1½	2	2½
Doz. pair	$0.60	.55	.52	.45

Mortise Reversible Shutter, (Buffalo, &c.)

No	1	1½	2
Doz. pair	$0.65	.60	.55

Parker ..... 70@75%
North's Automatic Blind Fixtures, No. 2, for Wood, $9.00; No. 3, for Brick, $11.50 ..... 10%
Reading's Gravity ..... 75&10%
Sargent's, Nos. 1, 2, 3 ..... 60%&10%
Sargent's, Nos. 11 & 12 ..... 70&10%
Wrightsville H'dware Co.:
O. S. Lull & Porter ..... 80&2½%
Acme, Lull & Porter ..... 75&10%
Queen City Reversible ..... 75&10%
Stenger's Positive Locking, Nos. 1 & 3 ..... 70&10&5%
Shepard's Noiseless, Nos. 60, 65, 55 ..... 70&10%
Niagara, Gravity Locking, Nos. 1, 3 & 5 ..... 75&7½%
1838, Old Pat'n, Nos. 1, 3 & 5 ..... 75&7½%
Tip Pat'n, Nos. 1, 3 & 5 ..... 75&7½%
Buffalo Gravity Locking, Nos. 1, 3 & 5 ..... 75&7½%
Shepard's Double Locking, Nos. 20 & 25 ..... 70&10%
Champion Gravity Locking, No. 75 ..... 75&7½%
Steamboat Gravity Locking, No. 10 ..... 5&7½%
Pioneer, Nos. 060, 45 & 5½ ..... 75&7½%
Empire, Nos. 101 & 103 ..... 70&7½%
W. H. Co.'s Mortise Gravity Locking, No. 2 ..... 60&10%
Stanley's Steel Gravity Blind Hinges, ₱ doz. sets $1.30 ..... 30&10%

Gate Hinges—

Clark's or Shepard's—Doz. sets:

No	1	2	3
Hinges with Latches	$1.90	2.50	3.25
Hinges only	1.30	1.90	2.90
Latches only	0.65	0.65	0.95

New England:
With Latch ..... doz. ....@$1.55
Without Latch ..... doz. ....@$1.25
Reversible Self-Closing:
With Latch ..... doz. ....@$1.80
Without Latch ..... doz. ....@$1.45
Western:
With Latch ..... doz. $1.40@1.75
Without Latch ..... doz. $0.95@1.20
Wrightsville H'dware Co.:
Shepard's or Clark's, Nos. 1 & 2 ..... 65&2½%
Shepard's or Clark's, No. 3 ..... 55&5%

Spring Hinges—

Holdback, Cast Iron, gro. $3.00@3.25
Non-Holdback, Cast Iron, gro. $6.75@7.25
J. Bardsley
Bardsley's Patent Checking 15%
Bommer Bros.:
Bommer's 33⅓%
Chicago Spring Butt Co.:
Chicago 20%
Floor Hinge 40%
Garden City Engine House 20%
Keene's Saloon Door 20%
Triple End 40%
Coleman Hdw. Co.:
Champion Holdback ..... ₱ gr. $10.00
J. G. C. ..... ₱ gr. $9.50
Nickel ..... ₱ gr. $9.00
Lawson Mfg. Co.:
Matchless 30%
Matchless Pivot 35%
Payson Mfg. Co.:
Oblique, Dbl. Acting ..... 50@50&5%
Stover Mfg. Co.:
Ideal, No. 16, Detachable, ₱ gr. $12.50
Ideal, No. 4 ..... ₱ gr. $9.00
New Idea No. 1 ..... ₱ gr. $9.00
New Idea, Double Acting 45%
Van Wagoner & Williams Hdw. Co.:
Acme, Wrt. Steel 30%
Acme, Brass 30%
American 30%
Columbia, No. 14 ..... ₱ gr. $9.00
Columbia, No. 18 ..... ₱ gr. $25.00
Columbia, Adjustable 30%
Gem, new list 25%
Clover Leaf ..... ₱ gr. $12.50
Oxford new list 25%

Extra 10% often given on most of these Hinges.

Wrought Iron Hinges—

Strap and T Hinges, &c., list Mar. 15, 1893:
Light Strap Hinges 68½%
Heavy Strap Hinges 70%
Light T Hinges ..... 50&10%
Heavy T Hinges ..... 60&10%
Extra Heavy T Hinges ..... 66⅔% } Extra 25&10@ 25&10¢ 5%
Hinge Hasps 55
Cor. Heavy Strap 70%
Cor. Ex. Heavy T 66⅔%
Screw Hook and Strap. { *6 to 12 in.* ..... lb. 2¾@3 c; *1½ to 20 in.* ..... lb. 2½@2¾c; *22 to 36 in.* ..... lb. 2¼@2½c
Screw Hook and Eye:
¾ to 1 inch ..... lb. 5¾@6 c
⅝-inch ..... lb. 6¾@7 c
½-inch ..... lb. 8¾@9 c

Hods, Coal—

	15	16	17	18 inch.
Galv. Open	$2 05	2.20	2.45	2.65 ₱ doz.
Jap. Open	$1.55	1.70	1.85	2.05 ₱ doz.
Galv. Funnel	$2.75	2.90	3.10	3.45 ₱ doz.
Jap. Funnel	$2.00	2.15	2.35	2.70 ₱ doz.

Hoes—Eye—

Scovil and Oval Pattern ..... 60¢&5@60¢10¢&5%
Grub. list Feb. 23, 1899 ..... 65@65&10%
D. & H. Scovil 35%

Handled—

Sept. 1, 1900, List:
Field and Garden ..... 75¢&2%
Ladies', Boys', Toy and Onion ..... 70¢10¢10%
Street and Mortar ..... 75¢7½¢2%
Cotton ..... 70¢10¢10¢5¢2%
Planters' ..... 70¢30%
Weeding 75%
Note.—Manufacturers and jobbers use a diversity of lists, and often sell at net prices.
Ft. Madison Crucible Garden Hoe ..... 75&2%
Ft. Madison Crescent Cultivator Hoe, per doz. ..... 75&10&2%
Ft. Madison Mattock Hoes:
Regular Weight ..... ₱ doz. $4.50
Junior Size ..... ₱ doz. $4.00
Ft. Madison Sprouting Hoe, ₱ doz. $4.80
Ft. Madison Dixie Tobacco Hoe. 75&30%
Kretsinger's Cut Easy, per doz. 75&2%
Warren Hoe 60%
W. & C. Ivanhoe ..... 75&2%
B. B. Cultivator Hoe ..... 75&10%
Acme Weeding ..... 75&10%
W. & C. Lightning Shuffle Hoe, ₱ doz. $5.50

Hog Rings and Ringers—See *Rings and Ringers.*

Hoisting Apparatus—See *Machines, Hoisting.*

Hollow Ware—See *Ware, Hollow.*

Holders—

Bit—
Angular, ₱ doz. $24.00 ..... 45&10%

File and Tool—
C. E Jennings & Co. Model Tool Holders 33⅓%
Nicholson File Holders and File Handles 33⅓%

Hooks—

Cast Iron—
Bird Cage, Reading ..... } 50&10@60%
Bird Cage, Sargent's List ..... }
Clothes Line, Sargent's List 50&10@10&10%
Ceiling, Sargent's List ..... 40&10%
Clothes Line, Stowell's 70%
Clothes Line, Reading List ..... 65&10@65&10&10%
Coat and Hat, Stowell's 70%
Coat and Hat, Reading ..... 70@75%
Coat and Hat, Sargent's List ..... 45&10%
Coat and Hat, Wrightsville ..... 65&10%
Harness, Reading List ..... 70&10@75%

Wire—

Belt 80%
Atlas, Coat and Hat:
Single Cases 45%
10 Case Lots ..... 45&10%
Czar Harness ..... 50&10&5%
Wire Coat and Hat:
Acme ..... 50&10&5%
B. B. ..... 50&10&5%
V Brace, Chief and Czar ..... 50&10&5%
Gem 60%
Bright Wire Goods—See *Wire.*

Wrought Iron—

Box, 6 in., per doz. $1.50; 8 in., $1.75; 10 in., $2.00.
Cotton ..... doz. $1.05@1.15
Wrought Staples, Hooks, &c.—See *Wrought Goods.*

Miscellaneous—

Bush, Light, doz. $5.50; Medium, $6.00; Heavy, $6.50

Grass ..... *Nos.*	1	2	3	4
Best	$1.50	1.75	2.00	
Common	$1.40	1.50	1.50	1.75

Potato and Manure 70%
Whiffletree ..... lb. 4¾c
Hooks and Eyes:
Brass ..... 60¢10¢10@70%
Malleable Iron ..... 70¢5@70¢10%
Covert Saddlery Works' Self Locking Gate and Door Hook ..... 60&10%
Crown Picture ..... 50&10%
Bench Hooks—See *Bench Stops.*
Corn Hooks—See *Knives, Corn.*

Horse Nails—See *Nails, Horse*
Horseshoes—See *Shoes, Horse.*

Hose Rubber—

Garden Hose, ¾-inch:

Competition	*ft.*	4¼@	4¾c
3-ply Standard	*ft.*	5 @	6 c
4-ply Standard	*ft.*	8 @	9 c
3-ply extra	*ft.*	9 @	10 c
4-ply extra	*ft.*	11 @	12 c

Cotton Garden, ¾-in., coupled:

Low Grade	*ft.*	6 @	7 c
Fair quality	*ft.*	8 @	9 c

Irons—Sad—

From 4 to 10 ..... lb 3@3¼c
B. B. Sad Irons ..... lb. 5½@6c
Chinese Laundry ..... lb. 5@5½c
Chinese Sad ..... lb. 3½@3¾c
Mrs. Potts', per set:

Nos.	50	55	60	65
	72c	69c	82c	79c

New England Pressing, lb. ..... 3½@3¾c

Soldering—

Soldering Coppers, 1 @ 1¼ lb., 21 @ 23c.; 2 lb., 19 @ 21c
Covert Mfg. Co ..... 20&2%

Pinking—

Pinking Irons ..... doz. 50@60c

Jack Screws—See *Screws.*

Jacks, Wagon—

Covert Mfg. Co., Steel ..... 45&2%
Daisy 70%
Lockport ..... 40@40&10%
Victor 60%
Lane's Steel 40%

Kettles—

Brass, Spun, Plain ..... 20@25%
Enameled and Cast Iron—See *Ware, Hollow.*

Knife Sharpeners—See *Sharpeners, Knife.*

Knives—

Butcher, Shoe, &c.—

Dick's Butcher Knives 40%
Foster Bros.' Butcher, &c 30%
Nichols' Butcher Knives 50%
Hay and Straw—See *Hay Knives.*

Corn—

Ft. Madison Cut-Easy, ₱ doz. $3.35
Withington Acme, ₱ doz., $2.65; Dent, $2.75; Adj. Serrated, $2.20; Serrated, $2.10; Yankee No. 1, $1.50; Yankee No. 2, $1.15.

Drawing—

Standard List ..... 70&5@70¢10%
Adjustable Handle ..... 25@33⅓%
Bradley's 35%
C. E. Jennings & Co. Nos. 45, 46 ..... 40&10%
Jennings & Grimm ..... 66⅔&5%
Swan's ..... 70&10&2½%
Watrous ..... 30&10@40%
L. & I. J. White ..... 20&5@25%
Cantelo's Folding ..... 50@50&5%

Hay and Straw—

Iwan's Sickle Edge ..... ₱ doz. $11.50
Lightning $7.50
Maine ..... ₱ doz. $8.50

Mincing—

Buffalo ..... ₱ gro. $15.00
Smith's, ₱ doz., Single, $2; Double, $3 ..... 45&50%

Miscellaneous—

Farriers' ..... doz. $2.00@3.00
Wostenholm's ..... ₱ doz. $3.00@3.25

Knobs—

Base, 2¼-inch, Birch, or Maple. Rubber tip, gro ..... $1.25@1.50
Carriage, Jap, all sizes ..... gro. 30@33c
Door, Mineral ..... doz. 60@65c
Door, Por. Jap'd ..... doz. 70@75c
Door, Por. Nickel ..... doz. $2.00@2.10
Bardsley's Wood Door, Shutter, &c 15%
Picture, Sargent's ..... 60&10%
Snow's Victor ..... 60&10%

Ladders, Step—

Handy Ladder Works':

Length.	Extended Length.	Shipped Ready for Use.	Shipped K. D., Per doz.
Feet.	Feet.	Per doz.	Per doz.
4	7	$16.00	$14.00
5	9	19.50	17.00
6	11	24.50	21.00
7	13	29.50	25.00
8	15	34.00	29.00
9	17	39.00	32.00
10	19	43.00	35.00
11	21	46.50	40.00
12	23	51.00	45.00

Ladles—Melting—
L. & G. Mfg. Co. 60%
P., S. & W. ..... 40@40&10%
Reading ..... 50&10%
Sargent's ..... 40@40&10%

Lanterns—Tubular—
Regular Tubular ..... doz. $4.50@5.00
Side Lift Tubular ..... doz. $4.75@5.25
Square Lift Tubular ..... doz. $4.75@5.25
Other Styles ..... 40&10@40&10&5%

Bull's Eye Police—
No. 1, 2¾ inch $3.60
No. 2, 3 inch $4.00

Latches, Thumb—
Roggin's Latches ..... doz. 32@33c

Lawn Mowers—
See *Mowers, Lawn.*

Leaders, Cattle—
Small ..... doz. 45c; *large*, 55c
Covert Mfg. Co. ..... 45&2%

Lemon Squeezers—
See *Squeezers, Lemon.*

Lifters, Transom—
Dickson:
3 x 4 ft. x ¼ ..... ₩ 100 $11.00
Other sizes, Iron ..... 70&10%
Other sizes, Brass and Bronze 70%
R. & E. 45%
Payson's:
Solid Grip Nos. 643 and 644 ₩ doz. $1.00
Bronzed Iron 70%

Lines—
Wire Clothes, Nos...	*18*	*19*	*20*
100 feet	*$2.20*	*2.00*	*1.65*
75 feet	*$1.80*	*1.70*	*1.30*

Ossawan Mills.
Crown Solid Braided Chalk ..... 33⅓&5%
Mason's, No. 0 to No. 5 ..... 33⅓&5%
Samson Cordage Works:
Solid Braided Chalk, No. 0 to 3 ..... 40%
Silver Lake Braided Chalk, No. 0, $6.00; No. 1, $6.50; No. 2, $7.00; No. 3, $7.50 ₩ gr. 30%

Locks—
Cabinet—
Cabinet Locks ..... 33⅓@33⅓&7½%

Door Locks, Latches, &c.—
[Net prices are very often made on these goods.]
Reading Hardware Co. 40%
R. & E. Mfg. Co. 50%
Sargent & Co. ..... 40@40&10%
Slaymaker-Barry Co. ..... 30@35%
Snow's Victor ..... 50&10%

Elevator—
Stowell's ..... 33⅓&5%

Padlocks—
Wrought Iron, list Dec. 5, '97 ..... 75&10%
Dog Collar, S. B. Co. 40%
R. & E. Mfg. Co. Wrt. Steel and Brass 50%
S. B. & Co. 40%

Sash, &c.—
Fitch's Bronze and Brass 66⅔%
Fitch's Iron 70%
Ives' Patent ..... 55&5@65%
Oefinger's Automatic 50%
Payson's Perfect 70%
Payson's Signal (new list) 75%
Reading ..... 60&10&10@70%

Machines—
Boring—
Without Augers.

	Upright.	Angular.
Improved No. 3	$4.25	No. 1 $5.00
Improved No. 4	3.75	No. 2 3.38
Improved No. 5	2.75	
Jennings'	2.50	3.00
Millers' Falls		5.75
Snell's, Rice's Pat.	2.50	2.75
Swan's, No. 500	5.10	No. 200 6.45

Hoisting—
Moore's Anti-Friction Differential Pulley Block 30%
Moore's Hand Hoist, with Lock Brake 20%

Ice Cutting—
Chandler's 15%

Washing—
Wayne American, ₩ doz. $28.00
Western Star, No. 2, ₩ doz. 28.00
Western Star, No. 3, ₩ doz. 30.00
St. Louis, No. 41, ₩ doz. 60.00
Carload lots 10% off, freight allowed.

Mallets—
Hickory ..... 45&5@50&5%
Lignumvitæ ..... 45&5@50&5%
Tinners', Hickory and Applewood, doz. ..... 50@55c
Fiber Head Stearns' ..... 30&10%

Mats—
Door—
Elastic Steel (W. G. Co.) 10%

Mattocks—
See *Picks and Mattocks.*

Meat Cutters—
See *Cutlers, Meat.*

Milk Cans—See *Cans, Milk*

Mills—Coffee—
Box and Side, list Jan. 1, '88 ..... 50&10c&5@60&5%
Net prices are often made on some goods which are lower than above discounts.
Enterprise Mfg. Co. ..... 25@30%
National, list Jan. 1, '94 ..... 30%
Parker's Columbia and Victor ..... 50&10c&30%
Parker's Box and Side ..... 50&10c&60%
Swift, Lane Bros. 30%

Mincing Knives—
See *Knives, Mincing.*

Molasses Gates—
See *Gates, Molasses.*

Money Drawers—
See *Drawers, Money.*

Mowers, Lawn—
Net prices are generally quoted.
Cheap ..... *all sizes, $2.00@2.10*
Good ..... *all sizes, $2.50@2.75*

	10	*12*	*14*	*16-inch*
High Grade	*4.25*	*4.50*	*4.75*	*5.00*

Pennsylvania and Continental ..... 60&10&5%
Quaker City ..... 70&5%
Great American ..... 70&5%
Philadelphia:

Nos.	6	7	8	9	10	
Styles M., S., C., K., T.						70&5%
Style A, all Steel						60&10%
Style E, Low Wheel						60&10%
Style E, High Wheel						70&10&5%

Drexel and Cold Coin, low list ..... 50&5%

Nails—
Cut and Wire. See Trade Report.
Wire Nails and Brads, Papered. List July 20, 1899 ..... 85@85&10%
Hungarian, Finishing, Upholsterers', &c. See Tacks

Horse—

Nos.	6	7	8	9	10	
A. C.	25¢	23¢	22¢	21¢	21¢	40&5%
Ausable	28¢	28¢	25¢	24¢	23¢	50&10%
Capewell	19¢	18¢	17¢	16¢	16¢	10&5%
C. B. K.	25¢	25¢	22¢	21¢	21¢	40%
Champ'in	28¢	26¢	25¢	24¢	23¢	40&5&2%
Clinton	19¢	17¢	16¢	15¢	14¢	30&10&5%
Maud S.	25¢	23¢	22¢	21¢	21¢	50%
Neponset	23¢	21¢	20¢	19¢	18¢	40%
Putnam	23¢	21¢	20¢	19¢	18¢	33⅓%
Standard	23¢	21¢	20¢	19¢	18¢	40%
Star	23¢	21¢	20¢	19¢	18¢	35&5%
Vulcan	23¢	21¢	20¢	19¢	18¢	25&10%

Amer. can, Nos. 6 to 10 ₩ ₺ ..... 9@9½¢

Picture

	1½	2	2½	3	3½	in.
Brass Head	*.45*	*.60*	*.70*	*.95*	*1.00*	*gro.*
Por. Head	*1.10*	*1.10*	*1.10*			*gro.*

Nippers, See *Pliers and Nippers.*

Nut Crackers—
See *Crackers, Nut.*

Nuts—
List Feb. 1, '99.
Cold Punched ..... Off
Mfrs. or U. S. Standard, list.
Hexagon, plain ..... 5.80@5.90c
Square, plain ..... 5.40@5.50c
Square, C. T. & R. ..... 5.60@5.70c
Hexagon, C. T. & R. ..... 6.40@6.50c
Hot Pressed:
Mfrs., U. S. or Nar. Gauge Stan'd.
Square Blank or Tapped ..... 5.80@5.90c
Hexagon Blank or Tap'd ..... 6.50@6.60c

Oakum—
Best or Government ..... *lb.* 6¼c
Navy ..... *lb.* 5½c
U. S. Navy ..... *lb.* 5¾c
Plumbers' Spun Navy 8¾c
In carload lots ¼c lb. off f. o. b. New York.

Oil, Axle—
Snow Flake:
1 pt. cans, per doz. $3.00
1 qt. cans, per doz. $4.80
1 gal. cans, per doz. $15 00
5 gal. cans, per doz. $66.00
33⅓&10%

Oil Tanks—See *Tanks, Oil.*

Oilers—
Brass and Copper ..... 40&10@50%
Tin or Steel ..... 60¢10@65%
Zinc ..... 60¢10@66%
Malleable, Hammers' Improved, No. 1, $3.60; No. 2, $4; No. 3, $4.40 ₩ doz. 20%
Malleable, Hammers' Old Pattern, same list ..... 50&10%
Wilmot & Hobbs Mfg. Co:
Spring Bottom Cans ..... 70@70&10%
Railroad Oilers etc. ..... 60@60&10%

Openers—
Can—
French ..... doz. 35c
Iron Handle ..... doz. 25@37c
Sprague, Iron Hdle ..... per doz 35@40c
Sardine Scissors ..... doz. $1.75@$3.00
Tip Top ..... per doz. $0.75
National, ₩ gro. ..... $1.75@$2.00
Stowell's ..... per doz. 40@45
Waldorf, ₩ gro. $9.00

Egg—
Nickel Plate ..... per doz., $2.00
Silver Plate ..... per doz., $4.00

Packing—
Rubber—
Standard, fair quality ..... 70&10@75%
Inferior quality ..... 75&10@80%
Extra ..... 60&5@60&10&5%
Jenkins' Standard, ₩ ₺ 50¢ ... 25@25&5%

Miscellaneous—
American Packing ..... 9@10c lb.
Cotton Packing ..... 13@14c lb.
Italian Packing ..... 10½@11¼c lb.
Jute ..... 5@5½c lb.
Russia Packing ..... 12@13c lb.

Pails—
Creamery—
S. S. & Co., with gauges .. No 1 $6.50; No. 2, $6.75 ₩ doz.

Galvanized—
Price per gro.

Inch	*10*	*12*	*14*
Water, Regular	*18 00*	*21.00*	*24.00*
Water, Heavy	*22.00*	*25.00*	*28.00*
Fire, Rd. Bottom	*31.00*	*33.00*	*35.00*
Well	*27.00*	*29.00*	*31.00*

Pans—
Dripping—
Standard List ..... 65¢10@65%

Fry—
Common Lipped:

No.	*1*	*2*	*3*	*4*	*5*
Per doz.	*$0.50*	*.75*	*.85*	*.95*	*1.15*

Roasting and Baking—
Regal, S. S. & Co., ₩ doz., Nos. 5, $4.50; 10 $5.00; 20 $5.50; 30, $6.00
Simplex, ₩ gro., No. 40 $30.00; 50, $34.50; 60 $39 00; 140, $33.00; 150, $37 50; 160, $43.00.

Paper—
Building Paper—

	Per roll
Rosin Sized Sheathing: Light wt. 20 sq. ft. to lb.	*500 sq. ft. $0.40@0.45*
Medium wt., 12 sq. ft. to lb.	*$0.60@0.65*
Heavy wt., extra quality	*$0.95@1.05*
Medium Grades Water Proof Sheathing	*$0.80@1.25*
Deafening Felt, 9, 6 and 4½ sq. ft. to lb., ton	*$40.00*
York Haven Waterproof Sheathing	$1 35@1.75

Tarred Paper.
1 ply (roll 800 sq. ft.), ton *$28 00*
2 ply, roll 100 sq. ft. ..... *50@55c*
3 ply, roll 100 sq. ft. ..... *75@80c*

Sand and Emery—
List Dec. 23, 1899 ..... 50¢10@50¢10¢10%
see Trade Report.

Parers—
Apple—

Advance	₩ doz. $4.50
Baldwin	₩ doz. $5.00
Bonanza	each $5.00
Dandy	each $7.50
Eureka, 1898	each $16.00
Family Bay State	₩ doz. $12.00
Hudson's Little Star	₩ doz. $4.00
Hudson's Rocking Table	₩ doz $5.50
Improved Bay State	₩ doz. $27.00@30.00
New Lightning	₩ doz. $5.50
Reading 72	₩ doz. $4.00
Reading 78	₩ doz. $7.00
Turn Table '98	₩ doz. $5.50
White Mountain	₩ doz. $4.00

Potato—

Saratoga	₩ doz. $5.50
White Mountain	₩ doz. $4.50

Picks and Mattocks—
List Feb. 23, 1899 ..... 75@75¢10%

Pinking Irons—
See *Irons, Pinking.*

Pins—
Escutcheon—
Brass ..... 60¢10%
Iron, list Nov. 11, '85 ..... 60¢10%

Pipe, Cast Iron Soil—
Factory Shipments.
Standard, 2-6 in. ..... 70@70¢5%
Extra Heavy, 2-6 in. ..... 75@75&5%
Fittings ..... 75¢10&5@80%
NOTE.—*Freight allowances on Carload lots.*

Pipe, Merchant, Boiler Tubes, &c.—
Carloads to Consumers.
Merchant Pipe.

	Black.	*Galvanized.*
⅛ to ½ inch	*61%*	*45%*
¾ to 10 inch	*68½%*	*56%*

Boiler Tubes

Steel.	*Up to 22 feet.*	*22 feet and over.*
1 to 1½ inch and 2¼ to 4½ inch	*49½%*	*44½%*
1¾ to 2¼ inch	*45%*	*39½%*
2¾ to 12 inch	*57%*	*52½%*
Iron.		
1 to 1½ inch and 2¼ to 4½ inch	*49½%*	*44½%*
1¾ to 2¼ inch	*45%*	*39½%*
2¾ to 12 inch	*57%*	*52½%*

Casing, Cut Lengths.	*S. & S.*
2 to 3 inch	*58%*
3½ to 4 inch	*63%*
4½ to 12½ inch	*65%*

NOTE.—*The old list is still used by some jobbers, and net prices are often quoted.*

Planes and Plane Irons—
Wood Planes—
Molding ..... 40@2½@40&5%
Bench, First quality ..... 45¢10@45¢10¢5%
Bench, Second quality ..... 50¢10@50¢10¢5%
Bailey's (Stanley R. & L. Co) 50&10@50&10&10%
Gage Self Setting 35%

Iron Planes—
Bailey's (Stanley R. & L. Co) ..... 50&10@50&10&10%
Chaplin's Iron Planes ..... 50&10%
Miscellaneous Planes (Stanley R. & L. Co.) ..... 25&10@25&10&10%
Sargent's ..... 50&10&10%

Plane Irons—
Wood Bench Plane Irons ..... 35@35&5%
Buck Bros. 30%
Butcher's ..... $5.00@5.25 to 2
Stanley R. & L. Co ..... 50&10@50&10&10%
L. & I. J. White ..... 20&5@25%

Planters, Corn, Hand.
Kohler's Eclipse ..... ₩ doz. $9.00

Plates—
Fellow ..... *lb.* 3½@4c
Self-Sealing Pie Plates (S. S. & Co.), ₩ doz. $2.00 ..... 50%

Pliers and Nippers—
Button Pliers ..... 65¢10@70¢10%
Gas Burner, per doz., 5 in. ..... *$1.15@ $1.20; 6 in.* ..... *$1.35@$1.45.*

Gas Pipe	*7*	*8*	*10*	*12-in.*
	$1.75	*$2.00*	*$2.75*	*$3.75*

Acme Nippers ..... 40@40&5%
Bernard's:
Parallel Pliers, &c 35%
Paragon Pliers ..... 50&5%
Lodi Pliers ..... 50&5%
Elm City Fence Pliers 35%
Cronk Hanger Co.:
Cronk's 60%
Improved Button ..... 70&5%
Scub's 50%
Combination and others 25%
Heller's Farriers' Nippers, Pincers, and Tools 50@50&5%
Morrill's Parallel, ₩ doz. $12.00 ..... 30&5%
P., S. & W. Cast Steel ..... 30&10@40%
P., S. & W. Tinners' Cutting Nippers, 40@40&5%
Swedish Side, End and Diagonal Cutting Pliers 50%
Utica Drop Forge & Tool Co.:
Pliers and Nippers, all kinds 40%

Plumbs and Levels—
Plumbs and Levels ..... 70¢10@75¢5%
Davis Iron, Machinist Nos. 1 to 14 ..... 30%
Davis Iron, Adjustable Nos. 6 to 49 ..... 35%
Disston's 70%
Pocket Levels ..... 75&10&10@75&10%
Stanley R. & L. Co. ..... 70&10&10@70&10&10%
Stanley's Duplex ..... 25&10@25&10&10%
Woods' Extension ..... 33⅓&5%

Poachers, Egg—
Buffalo Steam Egg Poachers, ₩ doz., No. 1, $7.20; No. 2, $11.00 No. 3, $11.00; No. 4, $14.50 ..... 50%

Points, C[illegible]—
Bulk and 1 lb. ₩ ..... 9½@10 c
¼-lb. papers ..... *lb.* 10 @10½c
¼-lb. papers ..... *lb.* 10½@11 c

Pokes, Animal—
Ft. Madison Hawkeye ..... ₩ doz. $3.25
Ft. Madison, Western ..... ₩ doz. $3.75

Police Goods—
Manufacturers' Lists ..... 25@25&5%
Tower's 25%

Polish—Metal—
Prestoline Liquid, No. 1 (1 pt.), ₩ doz. $3.00; No. 2 (1 qt.), $9.72 ..... 40%
Prestoline Paste ..... 33⅓@40%
U. S. Metal Polish Paste, 3 oz. boxes, ₩ doz. 50¢; ₩ gr. $4.50; ½ ₺ boxes, ₩ doz. $1.25; 1 ₺ boxes, ₩ doz. $2.25.
U. S. Liquid, 8 oz. cans, ₩ doz. $1.25; ₩ gr. $12.00.
Barkeepers' Friend Metal Polish, ₩ doz. $1.75; ₩ gr. $18.00.
Wynn's White Silk, ¼ pt. cans, ₩ doz. $1.50

Stove—
Black Eagle Benzine Paste, 5 ₺ cans ... ₩ ₺ 10¢
Black Eagle, Liquid, ½ pt. cans ..... ₩ doz. 75¢
Black Jack Paste, ¾ ₺ cans, ₩ gro. $9.00
Ladd's Black Beauty, gr. $10.00 ..... 50%
Joseph Dixon's, ₩ gr. $5.75 ..... 10%
Dixon's Plumbago ..... ₩ ₺ 8¢
Fireside ..... ₩ gr. $2.50
Gem, ₩ gr. $4.50 ..... 10%
Japanese ..... ₩ gr. $3.50
Jet Black ..... ₩ gr. $3.50
Peerless Iron Enamel, ½ pt. cans ..... ₩ doz. $1.50
Wynn's Black Silk, 5 ₺ pail ..... each 70¢
Wynn's Black Silk, ½ ₺ box, ₩ doz. $1.00
Wynn's Black Silk, 5 oz. box, ₩ doz. $0.75
Wynn's Black Silk, ¼ pt. liq., ₩ doz. $2.00

Poppers, Corn—
Round or Square:
1 qt ..... *gro. $7.00@$7.50*
1½ qt ..... *gro. 9 50@ 10 00*
2 qt ..... *gro. 10.50@ 11.00*

Post Hole and Tree Augers and Diggers—
See also *Diggers, Post Hole, &c.*

Potato Parers—
See *Parers, Potato.*

Pots—
Glue—
Enameled ..... 40¢10@50%
Tinned ..... 40¢10&5%

Powder—
In Canisters:
Duck, 1 lb. each 45c
Fine Sporting, 1 lb. each 75c
Rifle, ½-lb. each 15c
Rifle, 1-lb. each 25c
In Kegs:
Duck, 6½-lb. kegs $2.25
Duck, 12½-lb. kegs $4.25
Duck, 25-lb kegs $8.00
Rifle, 6¼-lb kegs $1.25
Rifle, 12½-lbkegs $2.25
Rifle, 25-lb. kegs $4.00

King's Smokeless Shot Gun and Rifle: 50&10@10&5%
Keg (25 ₺ bulk) $22 00
Half Keg (12½ ₺ bulk) $11.25
Quarter Keg (6¼ ₺ bulk) $5.75
Canister (1 ₺ bulk) $1.00
King's Semi-Smokeless: 50&10@10&5%
Keg (25 ₺ bulk) $16.00
Half Keg (12½ ₺ bulk) $8.25
Quarter Keg (6¼ ₺ bulk) $4.75
One Pound Can, bulk $0.50

Presses—
Fruit and Jelly—
Enterprise Mfg. Co. ..... 20@25%

Pruning Hooks and Shears—See *Shears.*

Pullers, Nail—
Crown, ₩ doz. $18.00 ..... 50%
Crown Prince, ₩ doz. $15.00 ..... 50%
Cyclops ..... 40@40&10%
Diamond B, No. 2, doz. $22.; No. 3, $11. ..... 40%
Eureka, 5 ₺, doz. $16.00; 3 ₺ $15 ..... 40%
Giant, No. 1, ₩ doz. $18; No. 2, $16.50; No. 3, $15. ..... 40%
Miller's Falls, No. 3, per doz. $12.00 ..... 15&10%
Pelican, ₩ doz. $9.00 ..... 40&10%
Scranton, No. 1 and 2, ₩ doz. $9.00
Scranton, No. 3, ₩ doz. $8.50

Pulleys—

Hay Fork, Swivel or Solid Eye..... doz. $1.50@1.75
Hay Fork, Stowell's Anti-Friction, 5-in. Wheel, ₩ doz. $12.00..... 40%
Hot House, Awning, &c.....60@60&10%
Japanned Clothes Line.....60@60&10%
Japanned Screw.....70&10&10%
Japanned Side.....70&10&10%
Stowell's Ceiling or End, Anti-Friction 60%
Stowell's Dumb Waiter, Anti-Friction .. 60&10%
Stowell's Electric Light..... 60%
Stowell's Side, Anti-Friction.....60&10%

Sash Pulleys—

Acme.....1¾ in., 16¢; 2 in., 19¢
Common Sense, 1¾ in.... ₩ doz., 18¢; 2 in., 20¢.
Empire.....1¾ in., 15½¢; 2 in., 18½¢
Fox-All-Steel, Nos. 3 and 7, 2¼ in..... ₩ doz. 25¢
No. 9, 1¾ in..... ₩ doz. 20¢
Extra for Plated Finish ...₩ doz. 20¢
Extra for Anti-Friction Bronze Bushing..... ₩ doz 10¢
Grand Rapids All Steel Noiseless....40%
Ideal No. 13.....1¾ in., ₩ doz., 20¢
Improved.....1¾ in., 15½¢; 2 in., 18½¢
Niagara.....1¾ in., 16¢; 2 in., 19¢
No. 26, Troy....1¾ in., 14½¢; 2 in., 16½¢
Star.....1¾ in., 16¢; 2 in., 19¢
Tackle Blocks—See *Blocks.*

Pumps—

Cistern.....60@60&10%
Pitcher Spout..... 75@75&10%
Pump Leathers ...sizes....gro. $6.00
Barnes Db ... list)... 55%
Flint & Wa... all...55@55&10%
Flint & Walling's Pitcher Spout.....75&5%
Loud's Suction Pumps, U. S. Co.....20%
Myer's Pumps, low list 50%
Contractors' Rubber Diaphragm Non-chokable, B. & L. Block Co..... 20%

Punches—

Revolving (4 tubes)...doz. $3 75@4.25
Saddlers' or Drive. good..doz. 65@70c
Spring, good quality.....$1.65@1 75
Bemis & Call Co.'s Cast Steel Drive....50%
Bemis & Call Co.'s Check.....55%
Bemis & Call Co.'s Spring.....50%
Niagara Hollow Punches.....45%
Niagara Solid Punches.....55%
Steel Screw, B & K. Mfg. Co.....40%
Tinners' Hollow, P., S. & W. Co..... 35@35&5%
Tinners' Solid, P., S. & W.Co., ₩ doz., $1.44.....55%

Rail—

Barn Door, &c.—

Barn Door, Light..In ⅛ ⅜ ¾
100 feet..... $2.00 $2 50 $5.00
B. D., for N. E. Hangers:
Small. Med. Large.
100 feet.....$2 20 2.70 3.20
Sliding Door, Bronzed Wr't Iron, ft. 6½¢
Sliding Door, Iron Painted....2½@3c
Sliding Door, Wrought Brass, 1½ in... lb. 36c..50%
Cronk's Double Braced Steel Rail, ₩ foot..... 3½¢
Cronk's O. N. T. Rail..... 3½¢
Lanes' O. N. T., ₩ 100 ft., 1 inch...$2.00
Lanes' Standard, ₩ 100 ft..... 3.75
Lawrence Bros' ..... ₩ ft. 4½¢
McKinney's None Better..... ₩ ft. 3½¢
McKinney's Standard..... ₩ ft. 3½¢
Moore's Wr't. Bracket, Steel..... 3½¢
Stowell's Steel Rail, Plain ..... 3½¢

Rakes—

Sept. 1, 1900, List:
Cast Steel.....70¢5¢&2%
Malleable.....70¢10@75¢5%
Lawn Rakes, Metal Head, per doz., 20 teeth. $3.25; 24 teeth $3 50.
Fort Madison Red Head Lawn....$3 25
Fort Madison Blue Head Lawn....$3 00
Jackson Lawn, 29 and 30 teeth..... ₩ doz. $4.50
Kohler's Lawn Queen, 24-tooth, ₩ doz. $4.00
Kohler's Paragon, 24-tooth, ₩ doz. $3.00
Kohler's Steel Garden, 14-tooth, ₩ doz. $3.50
Kohler's Malleable Garden, 14-tooth, ₩ doz.....$2.50

Rasps, Horse—

Disston's.....75%
Heller Bros.....60&10&10%
McCaffrey File Co. Horse Rasps..... 60&10&5%
New Nicholson Horse Rasp.....70&10%
See also *Files.*

Razors—

Fox Razors, No 42...₩ doz. $20.00 } 40%
Fox Razors, No 44, ..₩ d z $24.00 } dis.
Fox Razors, No. 82, Platina, ₩ doz $24.00
Sterling Razor Works 50%

Razor Strops—

See *Strops, Razor.*

Reels—Fishing—

Hendryx Aluminum, German Silver, Gold, Bronze, Silver, Rubber, Populo and Salmon, Single Action, Multiplying and Quadruple, all sizes.....25%
Hendryx Single Action Series, 102P and PN, 202P and PN, 102 PR and PRN, 202 PR and PRN, 304 P and PN, 00304P and PN, 502 and 502N, 802 and 802N, 02084N, Competitor.50%
Hendryx Multiplying and Quadruple Series, 3004N and PN, 4N and PN, 2904N, 2904P and PN, 002904PN, 0924 and 0924N, 5009N and PN.....40&10%
Shakespeare, Style C..... 25%

Registers—

Black Jap.....60¢10@60% } Extra 10% often given.
White Jap..... 40%
Bronzed..... 40%
Nickel Plated..... 50%
Electro Plated..... 40%

Riddles, Grain or Sand—

16 in. per doz.....$2.00@2.25
17 in. per doz.....$2.25@2.50
18 in. per doz.....$2.50@2.75

Rings and Ringers—

Bull Rings—

	2	2½	Inch.
Steel.....	$0 75	0.83	0.88 doz.
Copper.....	1.10	1.50	1 50 doz.

Hog Rings and Ringers—

Hill's Rings....gro. boxes, $4.50@5 00
Hill's Ringers, G. I. .....doz. 75c
Blair's Rings..... ₩ gr. $5.75@6.00
Blair's Ringers..... ₩ doz. $0.90@1.00
Brown's Rings..... ₩ gro. $6.00@6.25
Brown's Ringers..... ₩ doz $1.00@1.10
Perfect Rings..... ₩ gro. $9.00@9.50
Perfect Ringers, ₩ doz..... $1.25@1.35
Rapid Rings..... ₩ gro. $6.00
Rapid Ringers..... ₩ doz. $0.50

Rivets and Burrs—

Copper.....50@50&5%
Iron or Steel:
Tinners' .....70@70&10%
Miscellaneous ....70@70&10%

Rivet Sets—See *Sets.*

Roasting and Baking Pans—See *Pans, Roasting and Baking.*

Rollers—

Acme, Stowell's Anti-Friction 50%
Barn Door, Sargent's list.....50&10&10%
Cronk's Stay 6¼%
Cronk's Brinkerhoff..... 66⅔%
Lane's, Stay 33⅓%
Stowell's Barn Door Stay...₩ doz. $1.25

Rope—

Manila, 7-16 in. and larger.
lb. 9¼@10 c
Manila.....¾-inch lb. 10¼@10½c
Manila...¼ and 5-16 in. lb. 10¼@11 c
Manila, Tarred Rope, 15 thread.....lb 9¼@10 c
Manila Hay Rope Med'm.lb 9¼@10 c
Sisal, 7-16 in. and larger,lb. 6¾@ 7 c
Sisal..... .....⅜-inch. lb. 7¼@ 7½c
Sisal.....¼ and 5-16 in. lb. 7¾@ 8 c
Sisal, Hay Rope, 2 to 10 ply.....lb. 7 @ 7½c
Sisal, Tarred, Medium Lath Yarn..... .....lb. 6½@ 6¾c
Cotton Rope:
Best, ¼-in. and larger...lb... @14 c
Med'm, ¼-in. and larger lb... @11½c
Com., ¼-in. and larger.lb... @ 9 c
Jute Rope, No. 1, ¼ in. and up.....lb... @ 6½c
Jute Rope, No. 2, ¼ in and up.....lb .. @ 6 c

Wire Rope—

Galvanized .....25¢10¢2%
Plain..... .... 30¢10¢2%

Ropes, Hammock—

Covert Mfg. Co.....45&2%
Covert Saddlery Works.....60%

Rules—

Boxwood..75¢10¢10¢10¢10@75¢10¢10¢10¢10¢5%
Ivory ...40¢10¢10@40¢10¢10¢10¢10%
Lufkin's Steel.....50&10%
Lufkin's Lumber ... .50&10%
Stanley R. & L. Co.:
Boxwood...75&10&10@75&10&10&10%
Ivory..... .....35&10@35&10&10%

Sad Irons—See *Irons, Sad.*

Sand and Emery Paper and Cloth—

See *Paper and Cloth.*

Sash Cords—See *Cord, Sash.*

Sash Locks—See *Locks, Sash.*

Sash Weights—

See *Weights, Sash.*

Sausage Stuffers or Fillers—See *Stuffers or Fillers, Sausage.*

Saw Frames—

See *Frames, Saw.*

Saw Sets—See *Sets, Saw.*

Saw Tools—See *Tools, Saw.*

Saws—

Atkins' Circular..... .....50@50&10%
Atkins' Band .....50&10&60%
Atkins' Cross Cuts ..... 35&5%
Atkins' Mulay, Mill and Drag.....50&10%
Atkins' One-Man Saw..... .....40%
Atkins' Wood Saws 40%
Atkins' Hand, Compass, &c..... 40%
Disston's Circular Solid and Inserted Tooth..... 50%
Disston's Band 2 to 14 in. wide..... 60%
Disston Band ¼ to 1¾..... 70%
Disston Crosscuts.....45@45&10%
Disston Narrow Crosscuts....50@50&10%
Disston Mulay, Mill and Drag..... 50%
Disston Framed Woodsaws..35@35&7½%
Disston Wood saw Blades....40@40&7½%
Disston Wood saw Rods..... 25%
Disston Hand saws, Nos 12 99, 9 16, d100, D4, 120, 78, 72, 8.....25@25&7½%
Disston Hand Saws, Nos 7, 07, 10 7½, 3, 1, 0, 00, Combination... 30@30&7½%
Disston Compass Keyhole,&c.25@25&7½%
Disston Butcher Saws and Blades..... 35@35&7½%
C. E. Jennings & Co.'s.:
Back Saws..... .....25%
Butcher Saws..... .....35%
Compass and Key Hole Saws.....25%
Framed Wood Saws..... 40%
Hand Saws..... .....25@30%
Wood Saw Blades..... 45%
Peace Circular and Mill..... 50%
Peace Cross Cuts, list Jan. 1, '99.....50%
Peace Hand, Panel and Rip..... 30%
Richardson's Circular and Mill 50%
Richardson's X Cuts, list Jan. 1, '99..50%
Richardson's Hand, &c..... 30%
Simonds' Circular Saws..... 50%
Simonds' Crescent Ground Cross Cut Saws..... 35%
Simonds' One-Man Cross Cuts....40&10%
Simonds' Gang Mill, Mulay and Drag Saws.....45@45&5%

Hack Saws—

Disston Concave Blades..... 25%
Disston Keystone..... .....30%
Disston Hack Saw Frames..... .....30%
C. E. Jennings & Co's:
Hack Saw Frames, Nos. 175, 180, 330.....40%
Hack Saws, Nos. 175, 180, 330, complete..... .....40%
Griffin's Hack Saw Frames ... .45%
Griffin's Hack Saw Blades..... 45%
Star Hack Saws and Blades..... 15&10%

Scroll—

Barnes' No. 7, $15..... 25%
Barnes' Scroll Saw Blades..... 40%
Barnes' Velocipede Power Scroll Saw, without boring attachment, $18; with boring attachment, $20..... 20%
Lester, complete, $10.00.....15&10%
Rogers, complete, $4.00.....15&10%

Scale Beams—

See *Beams, Scale.*

Scales—

Family, Turnbull's.... ....30@30&10%
Hatch, Counter:
Platform, 4 lb. by ¼ oz...doz. $5.75
Two Platforms, 8 lb. by ½ oz..... doz. $16 00
Union Platform, Plain....$1.75@2.00
Union Platform, Striped..$1 85@2 15
Chatillon's Eureka..... 25%
Chatillon's Favorite..... 40%
Chatillon's Grocers' Trip Scales.....50%
Pelouze Scales—Household, Counter-Confectionery, Postal, Ice, &c.....50%
"The Standard" Portables 45%
"The Standard" R. R. and Wagon....50%

Scrapers—

Box, 1 Handle .....doz. $2.25@2.75
Box, 2 Handle ..... doz. $3.75@4.00
Ship, No 1, doz $3 50; No 2, $2 25@2.50
Adjustable Box Scraper (S. R. & L. Co.) $8.00..... .....30&10%
Foot, W. E. Pratt Mfg. Co.... ₩ doz. $1.15@$1.25

Screens, Window and Frames—

Bonanza Window Screens....60@60&5%
Fiver Pattern Window Screen.60@60&5%
Maine Window Screen Frames 40&10&5%
Perfection Window Screens.....60@60&5%
Phillips' Window Screen Frames..... 60&10&5%
Porter's Extension Window Screens.. 50&10%
Wabash Spring Adj. Screen. 50%

Screw Drivers—

See *Drivers, Screw.*

Screws—

Bench and Hand—

Bench, Iron..doz, 1 in., $5.00@3 25; 1¼, $5.50@3.75; 1¼, $4.00@4.50
Bench, Wood, Beech..doz. $3.50@2.75
Hand, Wood.....30¢10@40%
Hand, Grand Rapids..... 35%
Hand, R. Bliss Mfg. Co..... 35%

Coach, Lag and Hand Rail—

Lag, Common Point, list Oct. 1, '99..... .....80@...%
Coach and Lag, Gimlet Point, list Oct. 1, '99..... .....75¢15@...%
Hand Rail, list Jan. 1, '81.60¢10@...%

Jack Screws—

Millers Falls..... .....50&10&10%
Millers Falls, Roller ....50&10%
P., S. & W..... .....40&5@40&10%
Sargent..... .....70&10%

Machine—

List Jan. 1, '98.
Flat or Round Head, Iron.50@50¢10%
Flat or Round Head, Brass..... 50@50¢10%

Set and Cap—

Set (Iron or Steel) .....70¢10%
Sq. Hd. Cap..... .....65¢10%
Hex. Hd. Cap ....65¢10%

Wood—

List Jan. 1, 1900.
Flat Head, Iron.....85c } Extra 10@10 c% often given.
Round Head, Iron.....8.c
Flat Head, Brass.....82½c
Round Head, Brass.....77½c
Flat Head, Bronze 75c
Round Head, Bronze....72½c
Drive Screws .....

Scroll Saws—See *Saws, Scroll.*

Scythes—

Grass Scythes:
Natural Finish, per doz. $7.50@7 75
Pol. Blade.....*per doz. $8.00@8.15*
Painted or Bronzed..per doz. $8 00
Weed and Bush..per doz. $7.25@7.50

Scythe Snaths—

See *Snaths, Scythe.*

Seeders—

Raisin—

Enterprise..... .....25@30%

Sets—

Awl and Tool—

Brad Awl and Tool Sets:
Wood Hdle., 10 Awls doz. $2.00@2.25
Wood Hdle., 14 Awls, 6 Tools.... doz. $2.50@2.60
Aiken's Sets, Awl and Tools:
No. 20, ₩ doz. $10.00.....50&10&10%
Fray's Adj. Tool Hdls....Nos. 1, $12; 2, $18; 3, $12; 4, $9; 5, $7..... .....50%
Millers Falls Adj. Tool Hdls, No. 1, $12; No. 4, $12; No. 5, $18 .... 15&10%
Stanley's Excelsior: No. 1, $7.50; No. 2 $4.00; No. 3, $5.50.....30&10%@40&10&10%

Garden Tool Sets—

Ft. Madison Rakes, Shovel and Hoe.... ₩ doz.....$9.00

Nail—

Square.....*per gro. $2 50*
Round, Blk. and Pol., assorted..... *gro. $1.80@2.50*
Octagon..... .....*gro. $4.25@4.75*
Knurled, Good..... ....*gro. $6.00@6.50*
Buck Brothers..... 37½%
Cannon's Diamond Point, ₩ gr. $12..25%
Snell's Corrugated, Cup Pt..... 50%
Snell's Knurled, Cup Pt..... ....66⅔%

Rivet—

Regular list.....70@70¢10¢5%

Saw—

Aiken's Genuine..... ₩ doz. $5.50@6.00
Aiken's Imitation ..... ₩ doz. $3.00@3 10
Atkin's Criterion..... 40%
Atkin's Adjustable..... 40%
Bemis & Call Co.'s Cross Cut..... 30%
Bemis & Call Co.'s Plate..... 30%
Bemis & Call Spring Hammer..... 30%
Disston's Star and Monarch..... 25%
Hammer, Bemis & Call Co.'s new Pat. 45%
Morrill's No. 1, $15.00..... 40&20%
Nos. 3 and 4, Cross Cut, $23.00..40&20%
No. 5, Mill, $31.00..... 40&20%
No. 10, $15.50..... 40&20%
No. 11, $16.00..... 40&20%
Taintor Positive, ₩ doz. $18..... 60%

Sharpeners Knife—

Chicago Wheel & Mfg. Co..... 60@65%
Tanite Mills ₩ gross, $14.40....25@33⅓%

Sharpeners, Skate—

Eureka Skate Sharpener..... ₩ doz. $2.00

Shaves Spoke—

Iron.....*doz. $1 00@1 25*
Wood.....*doz. $1.75@2.25*
Bailey's (Stanley R. & L. Co.).....50&10%
Goodell's, ₩ doz. $9.00..... 15&10%

Shears—

Cast Iron...	7	8	9 in.
Best ...	$16.00	18.00	20.00 gro.
Good.....	$13 00	15.00	17 00 gro.
Cheap....	$5.00	6 00	7.00 gro.

Straight Trimmers, &c.:
Best quality, Jap..60¢10¢10@70¢5%
" *Nickel*.....60@60&5%
Fair qual. Jap.....75¢10@80%
" *Nickel*.....70¢10@75%
Tailors' Shears.....40@40¢10%
Acme Cast Shears.....40@40&5%
Heinisch's Tailors' Shears.....40@40&5%
Seymour's, Jap..... 70%
Seymour's Nickel..... 60%
Seymour's Tailors' Shears..... 40%
Wilkinson's Hedge..... 50%
Wilkinson's Sheep..... 100 list. 50%

Tinners' Snips—

Forged Handles, Steel Blades..20¢10%
Malleable Handles, Laid with Steel. 40%
Forged Handles, Steel Blades, Berlin.. 40&10%
Jennings & Griffin Mfg. Co's. 7 to 10 inch 50%
Niagara Snips..... 50%
Seymour's..... 40%
Seymour's Nickel..... 40@40&5

Pruning Shears and Tools—

Cronk's Pruning Shears..... 33⅓%
Disston's Combined Pruning Hook and Saw, ₩ doz. $18.00.....25@25&10%
Disston's Pruning Hook, ₩ doz. $12.00 ..... 25@25&10%
John T. Henry Mfg. Company's Pruning Shears all grades.....50&5%
Orange Shears..... 50&10%
Grape..... .....50&10%
Tree Pruners..... 75%
Nagley's Pruning Shears... ₩ doz. $8.00
P., S. & W. Co..... 33⅓@33⅓&10%
Seymour's..... .....60&10&10@70&5%

Sheaves—Sliding Door—

Stowell's Anti-Friction..... 50%
Patent Roller Hatfield's, Sargent's list, 80&10@80&10&7%
Reading..... ..... 70&10@75%
R. & F. list..... ..... 33⅓%
Wrightsville, Hatfield Pattern..... 80%

Sliding Shutter—

Reading list..... 70&10@75%
R. & F. list..... 33⅓%
Sargent's list..... .....50&16⅔&10%

Shells—

Shells, Empty—

Brass Shells, Empty:
First quality, all gauges..... 60&5%
Climax, Club, Rival, 10 and 12 gauge.. 65&5%
Paper Shells, Empty:
Acme, Ideal, Leader, New Rapid, Smokeless 10, 12, 16 and 20 gauge. 33⅓&10%
Blue Rival, New Climax, Primrose Club, Yellow Rival, 10, 12, 16 and 20 gauge..... 15%
Climax, Club, League, Rival, 14, 16 and 20 gauge ($7.50 list)..... 20&5%
Climax, Club, League, Rival, 10 and 12 gauge..... 25&5%
Defiance, High Base, New Victor, Nitro, Repeater, 10, 12, 16 and 20 gauge..... 15%
Trap and Metal Lined, 10, 12, 16 and 20 gauge..... 33⅓&10&5%

Shells, Loaded—

Loaded with Black Powder..... 40¢5%
Loaded with Nitro Powder..... 40¢10¢10¢5%

Shoes, Horse, Mule, &c.—

Factory Shipments:
Horse and Mule, per keg...$5 00@5.50
Barden's, all sizes..... $3.60
Bryden, Phoenix, Perkins, &c.. $3.75..5%
Diamond State, Crescent &c..$3.75..10%
Schoenberger $3.25
NOTE.—*There is a good deal of unevenness in current prices, whether from manufacturers or jobbers.*

Shot—

Drop, up to B, 25-lb. bag...$1.30@1.40.
Drop, up to B, 5-lb. bag ..... .35
Buck, 25 lb. bag..... .....$1.55@1.65
Buck, 5-lb. bag ..... .50
Chilled, 25 lb. bag..... ...$1.60@1.68
Dust Shot, 25 lb. bag.....$2.00@2.10
Dust Shot, 5-lb bag..... ... .50

Shovels and Spades—

No. 2, Polished, Sq. or Rd. Point, D or L Handle:

	A1, 1st Grade.	B2, 2d Grade
Plain Back....	$10 50	$9 60
Strap Back....	9.90	9 00
Cleveland Pat'n	10.20	9.30

	C3, 3d Grade.	D4, 4th Grade
Plain Back....	$8.70	$8.10
Strap Back....	8.10	7.50
Cleveland Pat'n	8.40	7.80

All other sizes add 50c doz.
Black deduct 30c doz.

Note.—The above are the regular Association prices to small retailers, but are often shaded by jobbers 50 to 75 cents per dozen. Common Plain Back Shovels are generally sold by jobbers at $6.75 per doz.

Shovels and Tongs—

Brass Head.....60&5@60&10%
Iron Head.....60&5@60&10%

Sieves and Sifters—

Hunter's Imitation, gro. $11.00@12.00
Buffalo Metallic Blued, S. S. & Co., ₱ gr.:

14&16	16&18	18&20
$12.90	$13.80	$15.00

Eclipse.....₱ gr. $10.00
Electric Light.....₱ gr. $12.00
Hunter's Genuine.....₱ gr. $12.50
Shaker (Barler's Pat.) Flour Sifters, ₱ doz., $2.00.....30%

Sieves, Tin Rim—

Per dozen

Inch	14	16	18	20
Black, full size	$0 95	.98	1.00	1.10
Plated, full size	.$1.05	1 08	1.10	1.20
Black, scant		$0.78	.80	.83

Sieves, Wooden Rim—

Nested, 10, 11 and 12 Inch.
Mesh 18, Nested, doz.....$0.75@0 80
Mesh 20, Nested, doz..... .85@ .90
Mesh 24, Nested, doz..... 1.00@1.05

Sinks—

Cast Iron—

Standard list.....60@60&10%
NOTE.—*There is not entire uniformity in lists used by jobbers.*

Wrought Steel—

Columbus Galv'd and Enameled..60&5%
Columbia, Painted.....45%
L. & G. Mfg. Co., Galvanized.....50%
L. & G. Mfg Co., Enameled.....50%

Skeins, Wagon—

Cast Iron.....70&10@75%
Malleable Iron.....40&10@50%
Steel.....40@40&10%

Slates—

"D" Slates.....50&10@50&10&10%
Unexcelled Noiseless Slates.....
60&6 tens@60&6 tens&5%
Wire Bound.....40&10@50%
Double Slates, add $1 case, net.

Slaw Cutters—See *Cutters.*

Slicers, Vegetable—

Sterling $2.00.....33⅓%

Snaps, Harness—

German.....40@40&10%
Covert Mfg. Co.:
Derby.....35&2%
High Grade.....45&2%
Jockey.....4 &2%
Trojan.....45&2%
Yankee.....35&2%
Yankee, Roller.....30&2%
Covert's Saddlery Works:
Banner.....60&10%
Crown.....60&10%
Triumph.....60&10%
W. & E. T. Fitch Co.:
Bristol.....40&10%
Empire.....50&5%
German.....40%
National.....50&5%
Perfect.....45%
Clipper.....50&5%
Champion.....40%
Security.....40%
Victor.....60&5%
Oneida Community:
Solid Steel.....65@65&10%
Solid Swivel.....65&10@65&10&10%
Sargent's Patent Guarded.....
60⅔&10%

Snaths—

Scythe.....45&5%

Snips, Tinners'—See *Shears*

Soldering Irons—

See *Irons, Soldering.*

Spoke Trimmers—

See *Trimmers, Spoke.*

Spoons and Forks—

Silver Plated—

Flat Ware.....60&10@60&10%
Wm. Rogers Mfg. Co.....50&10%

Miscellaneous—

German Silver.....60&10%
Wm. Rogers Mfg. Co.:
18% German Silver.....60%
Rogers' Silver Metal.....50&10%

Springs—

Door—

Gem (Coil).....20%
Star (Coil).....30%
Torrey's Rod, 39 in....₱ doz. $1.10@1.25
Victor (Coil).....59&10&10%

Carriage, Wagon, &c.

Factory Shipments.

1¼ in and wider...	*Blk. Hf Brt.*	*Brt.*	
	4¼	4½	4¾c lb

Cliff's Bolster Springs.....3½%
Cliff's Seat Springs.....₱ pair 55¢

Sprinklers, Lawn—

Enterprise.....25@30%
Philadelphia No. 1, ₱ doz. $12; No. 2, $15; No. 3, $24.....30%

Squares—

Nickel plated.... } *List Jan. 5, 1901*
Steel and Iron... } .....7 @75%
Rosewood Hdl. Try Square and T-Bevels.....60&10&10@70%
Iron Hdl. Try Squares and T-Bevels, 40&10@40&10&10%
Disston's Try Sq. and T-Bevels.....60&10%
Winterbottom's Try and Miter.....50&10%

Squeezers—

Lemon—

Wood, Common, gro., No. 0, $5.25 @$5 50; No 1, $6.25@$6.50.
Wood, Porcelain Lined:
Cheap.....*doz. $3.00@2.75*
Good Grade.....*doz. $3.00@3.50*
Tinned Iron.....*doz. $0.75@1.25*
Iron, Porcelain Lined doz. $2.90@3.25
Jennings' Star.....₱ doz. $1.85@1.90
King.....₱ doz. $2.00

Staples—

Barbed Blind.....*lb. 8¼@8¼c*
Electricians', Association list..75&10%
Fence Staples, same price as Barbed Wire, See Trade Report.
Poultry Netting, Staples....per lb..
4@4¼c
Grand Crossing Tack Co.'s list....80&10%

Steels, Butchers'—

Dick's.....40%
Foster Bros'.....30%
C. & A. Hoffmann's.....40%
Nichols Bros.....50%

Steelyards.....25@25&10%

Stocks and Dies—

Blacksmiths'.....40@40&10%
Gardner Die Stocks No. 1.....50%
Gardner Die Stocks, larger sizes.....40%
Green River.....25%
Lightning Screw Plate.....25%
Little Giant.....25%
Reece's New Screw Plates.....25@30%
Curtis Reversible Ratchet Die Stock.25%

Stone—

Scythe Stones—

Chicago Wheel & Mfg. Co:
Gem Corundum, 10 inch, $10.80 per gro., 12 inch, $12.00
Cleveland Stone Co., list Nov., '92..33⅓%
Pike Mfg. Co., list '95-'96.....33⅓%

Oil Stones, &c.

Chicago Wheel & Mfg. Co.:
Corundum Oil, Double Grit.....50%
Corundum Axe Stones, Slips, etc.....55%
Pike Mfg. Co.:
Hindostan No. 1, ₱ b...8¢
Sand Stone.....5¢
Turkey Oil Stone, Extra, 5 to 8 in.....80¢ } 33⅓@ 33⅓&10%
Turkey Slips.....$1.50
Lily White Washita.....60¢
Rosy Red Washita.....60¢
Washita Stone, Extra.....50¢
Washita Stone, No. 1.....40¢
Washita Stone, No. 2.....30¢
Lily White Slips.....90¢
Rosy Red Slips.....90¢
Washita Slips, Extra.....80¢
Washita Slips, No. 1.....70¢
} 33⅓%
Arkansas Stone, No. 1, 3 to 5 in. $2.80
Arkansas Stone, No. 1, 5 to 8 in. $3.50
India Oil Stones.....25%
Tanite Mills:
Emery Oil, ₱ doz. $5.00.....50@60%

Stoners—

Cherry—

Enterprise.....25@30%

Stops, Bench—

Millers Falls.....15&10%
Morrill's...₱ doz., No. 1, $10.00; No. 2, $11.00, 40&20%

Stops, Window—

Ives' Patent.....25&5%
Wilcox, Steel, per doz., $6.00.....50%

Stove Boards—

See *Boards, Stove.*

Stove Polish—See *Polish, Stove.*

Strainers, Pump—

Diamond Joe Pump Strainers..per doz. 75¢

Straps, Box—

Cary's Universal case lots.....20&10%

Stretchers, Carpet—

Cast Iron, Steel Points....doz. 55@65c
Socket.....*doz. $1.75*

Stuffers, Sausage—

Miles' Challenge, ₱ doz. $20...50@50&5%
Enterprise Mfg. Co.....25@25&7½%
National Specialty Mfg. Co., list Jan. 1, '97.....30%

Tacks Brads, &c.—

List Jan. 15, '99.
Carpet Tacks, American...90&40@..%
American Cut Tacks.....90&30@..%
Swedes Iron Tacks.....90&40@..%
Swedes Upholsterers' Tacks,
90&40@..%
Gimp Tacks.....*90&40@..%*
Lace Tacks.....*90&40@..%*
Trimmers' Tacks.....*90&30@..%*
Looking Glass Tacks.....*70&10@..%*
Bill Posters' and Railroad Tack....
90&40@..%
Hungarian Nails.....*80&25@..%*
Common and Patent Brads, 70&10@..%
Trunk and Clout Nails.. *80&10@..%*

NOTE.—*The above prices are for "straight Weights." An extra 5% is given Star Weights" and an extra 10&5% on Standard Weights."*

Miscellaneous—

Double Point Tacks.....90&6 or 7 tens
Steel Wire Brads, R. & E. Mfg. Co.'s list.....*50&10@60%*
See also *Nails, Wire.*

Tanks, Oil—

Emerald, S. S. & Co.....30-gal. $3.20
Emerald, S. S. & Co.....60-gal., $4.00
Queen City S. S. & Co., 30-gal.....$3.50
Queen City S. S. & Co., 60-gal.....$4.25

Tapes, Measuring—

American Asses' Skin.....40&10@50%
Patent Leather.....*25@30&5%*
Steel.....*40@40&5%*
Chesterman's.....*25@25&5%*
Eddy's Steel.....40@40&5%
Eddy's Metallic.....33⅓@33⅓&5%
Keuffel & Esser Co., Steel and Metallic, Lower list, 1899.....35%
Lufkin's Steel.....33⅓@35%
Lufkin's Metallic.....30@30&5%

Thermometers—

Tin Case.....*80@80&10%*

Ties, Bale—Steel.

Standard Wire.....*50&10&5%*

Ties, Wall—

Cleveland Wire Spring Co.:
Galv. Steel 5-32 x 6¼ in. ₱ 1000..$10.00
Galv. Steel 5-32 x 8¼ in. ₱ 1000..$11.00
Galv. Steel 5-32 x 11¼ in. ₱ 1000..$12.00
Galv. Steel 5-32 x 15¼ in. ₱ 1000..$14.00

Tinners' Shears, &c.—

See *Shears, Tinners', &c.*

Tinware—

Stamped, Japanned and Pieced, sold very generally at net prices.

Tire Benders, Upsetters, &c.—See *Benders and Upsetters, Tire.*

Tobacco Cutters—

See *Cutters, Tobacco.*

Tools—

Coopers'—

L. & I. J. White.....20@20&5%

Saw—

Atkins' new list.....40%
Simonds' Improved.....33⅓%
Simonds' Crescent.....25%

Ship—

L. & I. J. White.....25%

Transom Lifters—

See *Lifters, Transom.*

Traps—Game—

Oneida Pattern.....*70&10@75&10%*
Newhouse.....45@50%
Hawley & Norton.....65&5@70%
Victor (Oneida Pattern).....75@75&10%
Star (Blake Pattern).....65&10@70&5%

Mouse and Rat—

Mouse, Wood, Choker, doz. holes...8½c
Mouse, Round or Square Wire.....
doz. $0.85@1.00
Diamond Joe Mouse Traps....per doz. 60¢
Diamond Joe Rat Traps.....per doz. $1.00
Marty French Rat and Mouse Traps (Genuine):
No. 1, Rat, Each $1.12½;..₱ doz. $12.00
No. 3, Rat, ₱ doz. $6.00; case of 50 $5.25 doz.
No. 3½, Rat, ₱ doz. $4.75; case of 72 $4.25 doz.
No. 4, Mouse, ₱ doz. $3.50; case of 72 $2.75 doz.
No. 5, Mouse, ₱ doz. $2.75;..case of 72 $2.25
Schuyler's Rat Killer, No. 1, ₱ gr. $30.00; No. 2, ₱ gr. $30.00; Mouse, No. 3, $18.00.....50%

Fly—

Balloon, Globe or Acme.....
doz. $1.15@1.25; gro. $12.00@14.00
Harper, Champion or Paragon .....
doz. $1.25@1.40: gro. $13.50@15.00

Trimmers, Spoke—

Bonney's Nos. 1 and 2.....40%
Stearns.....25%

Trowels—

Disston Brick and Pointing.....30%
Disston Plastering.....25%
Disston "Standard Brand" and Garden Trowels.....40%
Never-Break Steel Garden Trowels.....
gro. $7.00
Peace's Plastering.....30%
Rose Brick and Plastering.....25&5%
Woodrough & McParlin, Plastering.25&10%

Trucks, Warehouse, &c.—

B. & L. Block Co.'s list.....40%
Daisy Stove Trucks, Improved pattern ₱ doz. $21.00
Model Stove Trucks.....₱ doz. $18.50

Tubs, Wash—

	No. 1	*2*	*3*
Galvanized, per doz.	*$5.00*	*5 50*	*6.00*

Galvanized Wash Tubs (S. S. & Co.):

No.	1	2	3	10	20	30
Per doz	$5 25	6.00	6.75	6.50	7 25	8.00

Twine—

Miscellaneous—

Flax Twine—	*BC*	*B.*
No. 9, ¼ and ½-lb. Balls	*22c*	*26c*
No. 12, ¼ and ½-lb. Balls	*18c*	*21c*
No. 15, ¼ and ½-lb. Balls	*16c*	*19c*
No. 24, ¼ and ½-lb. Balls	*15½c*	*18½c*
No 36, ¼ and ½-lb. Balls	*15c*	*18c*

Chalk Line, Cotton, ½-lb. Balls.....
22@22½c
Cotton Mops, 6, 9, 12 and 15 lb. to doz.....*7@8c*
Cotton Wrapping, 5 Balls to lb ...
10¼c@..
American 2-Ply Hemp, ¼ and ½-lb. Balls.....*12@13c*
American 3 Ply Hemp, 1-lb. Balls..
12@13c
India 2-Ply Hemp, ¼ and ½-lb. Balls (Spring Twine).....*9c*
India 3-Ply Hemp, 1-lb. Balls.....*9c*
India 3-Ply Hemp, 1¼-lb. Balls.....*8c*
2, 3, 4 and 5-Ply Jute, ½-lb. Balls...
10@10½c
Mason Line, Linen, ½-lb. Balls...45c
No. 2½ Mattress, ¼ and ½-lb. Balls.37c
Wool.....*7c*

Vises—

Solid Box.....*50%*
Bonney's Saw Vises.....40&10%

Parallel—

Athol Machine Co.:
Simpson's Adjustable.....40%
Standard.....40%
Amateur.....25%
Bonney's.....40&10%
Fisher & Norris Double Screw....15&10%
Hollands':
Machinists'.....40%
Keystone.....70%
Lewis Tool Co.....20@30%
Massey's Perfect.....15@20%
Massey's Clincher.....30@40%
Merrill's.....20%
Miller's Falls.....low list 10%
Parker's:
Victor.....20@25%
Regulars.....20@25%
Vulcan's.....40@45%
Combination Pipe.....55&60%
Prentiss.....20@25%
Sargent's.....40%
Simpson's Adjustable.....40%
Snedliker's X. L.....20@25%
Stephens'.....20@25%
Toles' Woodworking.....25%
Van, W. & W. Hdw. Co.....40%

Saw Filers—

Bonney's, No. 1, $13; No. 3, $16 .50&10%
Disston's D 3 Clamp and Guide, ₱ doz $30.....25%
Reading.....40&10%
Wentworth's Rubber Jaw, Nos. 1, 2 and 3.....30&10%

Miscellaneous—

Bignall & Keeler Combination Pipe Vise.....60%
Parker's Combination Pipe:
87 Series.....60%
187 Series.....60&5%
No. 870.....40%

Wads—Price Per M.

B. E., 11 up	*60c*
B. E., 9 and 10	*70c*
B. E., 8	*80c*
B. E., 7	*80c*
P. E., 11 up	*$1.00*
P. E., 9 and 10	*1.25*
P. E., 8	*1.50*
P. E., 7	*1.50*
Ely's B E., 11 and larger	*$1.70@1.75*
Ely's P. E., 12 to 90	*$3.00@3.25*

Dis. 50&5%

Wagon Jacks—

See *Jacks, Wagon.*

Ware, Hollow—

Aluminum—
S. S. & Co. Reduced List.....40%

Cast Iron, Hollow—

Stove Hollow Ware:
Ground.....*60&5@65%*
Unground.....*65&10@70%*
White Enameled Ware:
Maslin Kettles.....*75&10@80%*
Boilers and Saucepans.....*50&5@50&10%*
Tinned Boilers and Saucepans.....
50&5@50&10%
See also *Pots, Glue.*

Enameled—

Agate Nickel Steel Ware, list July '99..35%
Granite Ware, list Jan. 1, '94, revised Jan. 2, '95.....40&10%
Second Quality, Agate Nickel Steel..65%
Second Quality, Granite.....
70&10@70&10&10%
Iron Clad:
Peppered Ware, high list.....70%
Mottled Ware, high list.....75%
Never Break Enameled....50&5@50&10%

Tea Kettles—

Galvanized Tea Kettles:

Inch	*6*	*7*	*8*	*9*
Each	*45c*	*50c*	*55c*	*65c*

Steel Hollow Ware.

Avery Spiders & Griddles.....65@65&5%
Avery Kettles.....60%
Porcelained.....50&5@50&10%
Never Break Spiders and Griddles.....
65@65&5%
Never Break Kettles.....60@60&10%
Solid Steel Spiders & Griddles.....65&5%
Solid Steel Kettles.....60%
Solid Steel Ware, Enameled.....50&5%

Silver Plated Hollow—

William Rogers Mfg. Co.....40&10%

Washboards—

Solid Zinc: ₱ doz
Crescent, family size, bent frame..$3.00
Red Star, laundry size, stationary protector.....$4.25
Double Zinc Surface:
Saginaw Globe, family size, stationary protector.....$2.65
Wilson, family size, bent frame...$2.75
Single Zinc Surface:
Naiad protector, family size, open back peforated.....$2.40
Saginaw Globe, protector, family size, ventilated back.....$2.25
Wilson, bent frame family size, ventilated back.....$2.25

Washers—

Leather, Axle—

Solid ..... 80&10&10@85%
Patent ..... 85&10@35&20%
Coil: ⅜ 1 1¼ 1¼ *Inch.*
11c 13c 13c 15c *per 100*

Iron or Steel -

Size bolt ... 5-16 ⅜ ½ ⅝ ¾
Washers ... $5.60 4.70 3. 0 3.20 3.00
In lots less than one keg add ¼c per lb., 5-lb. boxes add ½c to list.

Cast Washers—

Over ½ inch, barrel lots, per lb ..... 1½@1¾c

Washer Cutters—

See *Cutters, Washer.*

Washing Machines—

See *Machines, Washing.*

Water Coolers—

See *Coolers, Water.*

Weaners—

Tyler's New Halter—No. 1 ₱ doz. $3.45; No. 2, $3.70; No 3, $4.00; No 4 $4 30
Tyler's Safety—Nos. 1 and 2, ₱ doz. $1.70; No. 3, $2.00; No. 4, $2.30.

Wedges—

Oil Finish ..... *lb.* 3½c

Weights, Sash—

Eastern prices $25.00
Western prices ..... $18.00@19.00
NOTE.—*There is a wide difference in prices East and West, and some Foundries are naming lower prices than the above.*

Well Buckets, Galvanized

See *Pails, Galvanized.*

Wheels Well—

8-in., $1.65@1.75; *10-in.*, $2.00@2.10; *12-in.*, $2.50@2.75; *14-in.*, $3.25@3.40

Wire and Wire Goods—

Brt. and Ann., 6 to 9 ..... 70&10%
Brt. and Ann., 10 to 18 ..... 72½&5%
Brt. and Ann., 19 to 26 ..... 75&7½%
Brt. and Ann., 27 to 36 ..... 75&10&2½%
Cop'd and Galv., 6 to 9 ..... 66⅔&5%
Cop'd and Galv., 10 to 18 ..... 70%
Cop'd and Galv., 19 to 26 ..... 70&10%
Cop'd and Galv., 27 to 36 ..... 72½&5%
Tinned, 6 to 14 ..... 70&10&5%
Tinned, 15 to 18 ..... 70&5&5%
Tinned, 19 to 26 ..... 70%
Tinned, 27 to 36 ..... 65&10%
Annealed Wire on Spools .. 70&5@70 &10%
Brass and Copper Wire on Spools .. 60&5@50&10%
Brass, list Feb. 26, '96 ..... 25%
Copper, list Feb. 26, '96 ..... 15%
Cast Steel Wire 50%
Stubs' Steel Wire ..... $6.00 to $2. 40%
Wire Clothes Line, see *Lines.*
Wire Picture Cord, see *Cord.*

Bright Wire Goods—

Iron and Brass, list July 1, 1899 .... 85@95&10%

Wire Cloth and Netting—

Galvanized Wire Netting .30&20@35%
Painted Screen Cloth per 100 ft ..... $1.00@$1.05

Light Hardware Grade:
2-8 Mesh, Plain (8c. list) sq. ft. .. 1¾c
2-8 Mesh, Galv. (8c. list) sq ft ... 2¼c

Wire Barb—See *Trade Report.*

Wire, Rope—See *Rope, Wire.*

Wrenches—

Agricultural ..... 70&10@75%
Case lots ..... 75&10%
Baxter's S ..... 60&10%
Coes' Genuine ..... 40&10&5&5%
Coes' "Mechanics' " ..... 40&10&10&5&5%
Acme ..... 60&10%
Alligator ..... 60&10&10%
Bemis & Call's:
Adjustable S ..... 35&5%
Adjustable S Pipe 40%
Brigg's Pattern ..... 30&10%
Combination Black ..... 40&5%
Combination Bright 40%
Cylinder or Gas Pipe 55%
Extra Heavy 45%
Merrick's Pattern 50%
No. 3 Pipe, Bright 55%
Bindley Automatic 30%
Boardman's 33⅓%
Bull Dog, W. & B ..... 60&10&10%
Donohue's Engineer ..... 40&10%
Eagle ..... 50&10%
Gem Pocket 30%
Hercules 70%
Solid Handles, P. S. & W ..... 50&10%
Stevenson ..... 60&10&10%

Wrought Goods—

Staples, Hooks, &c., list March 17 '92 ..... 85&10@35&25%

Yokes, Neck—

Covert Saddlery Works, Trimmed 60&5%
Covert Saddlery Works, Neck Yoke Centers 70%

Yokes, Ox, and Ox Bows—

Fort Madison's Farmers & Freighters' ... list net

Zinc—

Sheet ..... *lb* 6½c@7c

PAINTS, OILS AND COLORS.—Wholesale Prices.

White Lead, Zinc, &c.

Lead, Foreign white, in Oil ... ₱ lb 7½@ 9¾
Lead, American White, in Oil:
Lots of 500 lb or over ..... @ 6½
Lots less than 500 lb ..... @ 7
Lead, White, in oil, 25 lb tin pails, add to keg price ..... @ ⅛
Lead, White, in oil, 12½ lb tin pails, add to keg price ..... @ 1
Lead, White, in oil, 1 to 5 lb assorted tins, add to keg price ... @ 1½
Lead White, Dry in bbls ..... 5¾@ 6
Lead, American. Terms: On lots of 500 lbs. and over, 60 days, or 2% for cash if paid in 15 days from date of invoice.
Zinc, American, dry ..... ₱ lb 4⅜@ 4⅞
Zinc, Paris, Red Seal, dry ..... @ 8½
Zinc, Paris, Green Seal, dry ..... @ 9½
Zinc, Antwerp Red Seal, dry ..... @ 6½
Zinc, Antwerp, Green seal, dry ..... @ 7¾
Zinc, V. M. French, in Poppy Oil, Green Seal:
Lots of 1 ton and over ..... 12 @12¼
Lots of less than 1 ton ..... 12¼@12¾
Zinc, V. M French, in Poppy Oil, Red Seal:
Lots of 1 ton and over ..... 10¾@11¼
Lots of less than 1 ton ..... 11@11½
DISCOUNTS.—V. M. French Zinc.—Discounts to buyers of 10 bbl. lots of one or assorted grades, 1%; 25 bbls., 2%; 50 bbls., 4%.

Dry Colors.

Black, Carbon ..... ₱ lb 8 @20
Black, Drop, Amer ..... 2½@ 4
Black, Drop, Eag ..... 7 @11
Black, Ivory ..... 15 @21
Lamp, Com ..... 3 @ 5
Blue, Celestial ..... ₱ lb 5½@ 8
Blue, Chinese ..... 35 @40
Blue, Prussian ..... 30 @38
Blue, Ultramarine ..... 30 @35
Brown, Spanish ..... ¼@ 1
Brown, Vandyke, Amer ..... 1¾@ 2½
Brown, Vandyke, Foreign ..... 2½@ 3½
Carmine, No. 40 ..... ₱ lb $2.15@2.75
Green, Chrome, ordinary ..... 5 @ 6
Green, Chrome, pure ..... 16 @20
Lead, Red, bbls. ½ bbls. and kegs:
Lots 500 lb or over ..... @ 6½
Lots less than 500 lb ..... @ 6¾
Litharge, bbls. ½ bbls. and kegs:
Lots 500 lb or over ..... @ 6½
Lots less than 500 lb ..... @ 6¾
Ocher, French Washed ..... 1½@ 2½
Ocher, Dutch Washed ..... 4½@ 5
Ocher, American ... ₱ ton $10.00@15.00
Orange Mineral, English .. ₱ lb 8 @11½
Orange Mineral, French ..... 11½@11⅝
Orange Mineral, German ..... 8¾@ 9½
Orange Mineral, American .... 8 @ 8½
Red, Indian, English ..... 4½@ 8½
Red, Indian, American ..... 3 @ 3½
Red, Turkey, English ..... 4 @ 6
Red, Tuscan, English ..... 7 @10
Red, Venetian, Amer., ₱ 100 lb. 80@1.10
Red Venetian, English ₱ lb .. 1.80@2.10
Sienna, Italian, Burnt and Powdered ..... ₱ lb 3½@ 9½
Sienna, Ital., Raw, Powd ..... 3½@ 7½
Sienna, American, Raw ..... 1½@ 2
Sienna, American, Burnt and Powdered ..... ₱ lb 1½@ 2
Talc, French ..... ₱ 100 lb $1.25@1.50
Talc, American ..... .90 @1.10
Terra Alba, French, ₱ 100 lb .95 @1.00
Terra Alba, English ..... .95 @1.00
Terra Alba, American No. 1 ... .65 @85
Terra Alba, American No. 2 ... .45 @50
Umber, Turkey, Bnt. & Pow. ₱ lb 2½@ 3½
Umber, Turkey, Raw & Powd. 2½@ 3½
Umber, Bnt. Amer ..... 1½@ 2
Umber, Raw, Amer ..... 1½@ 2
Yellow, Chrome ..... 10½@25
Vermilion, American Lead ..... 10 @25
Vermilion, Quicksilver, bulk .. @72
Vermilion, Quicksilver, bags ... @73
Vermilion, English, Import .. .80 @95
Vermilion, Chinese .... .88 @95

Colors in Oil.

Black, Lampblack ..... 12 @14
Blue, Chinese ..... 36 @40
Blue, Prussian ..... 32 @35
Blue, Ultramarine ..... 13 @16
Brown, Vandyke ..... 9½@13
Green, Chrome ..... 10 @12
Green, Paris ..... @24
Sienna, Raw ..... 10 @13
Sienna, Burnt ..... 10 @13
Umber, Raw ..... 9½@12
Umber, Burnt ..... 9½@12

Miscellaneous.

Barytes, Foreign, ₱ ton .... $19.00@21.00
Barytes, Amer. floated ..... 19.00@20.00
Barytes, Crude ..... 9.00@10.00
Chalk, in bulk ..... ₱ ton 2.60@ 2.75
Chalk, in bbls ..... ₱ 100 lb ..@ 35
China Clay, English .. ₱ ton 12.00@17.50
Cobalt, Oxide ..... ₱ 100 lb 2.20@ 2.50
Whiting, Common. ₱ 100 lb .42@ .52
Whiting, Gilders ..... .54@ .64
Whiting, extra Gilders' .... .58@ .68

Putty.

In bulk $1.90
In bladders 2.40
In cans, 12 lb to 25 lb 2.50
In cans, 1 lb to 5 lb 3.60

Spirits Turpentine.

In Southern bbls .... @40 c
In machine bbls ..... @40½c

Glue.

Low Grade ..... ₱ lb 13 @15½
Cabinet ..... 13½@16½
Medium White ..... 14½@16½
Extra White ..... 18 @23
French ..... 12 @40
Irish ..... 13½@16

Animal, Fish and Vegetable Oils.

Linseed, City, raw ..... ₱ gal. 60@61
Linseed, City, boiled ..... 62 @63
Linseed, State and West'n, raw 53 @58
Linseed, raw Calcutta see I ..... @85
Lard, Prime ..... 65 @66
Lard, Extra No. 1 ..... 47 @49
Lard, No. 1 ..... 41 @42
Cotton-seed, Crude ..... 27 @27½
Cotton-seed, Summer Yellow, prime ..... 29½@30
Cotton-seed Summer Yellow, off grades ..... 29½@29¾
Sperm, Crude ..... @ ...
Sperm, Natural Spring ..... @ ...
Sperm, Bleached Spring ..... @ ...
Sperm, Natural Winter ..... 55 @56
Sperm, Bleached Winter ..... 60 @61
Whale, Crude ..... @ ...
Whale, Natural Winter ..... @47
Whale, Bleached Winter ..... @49
Menhaden, Crude, Sound ..... 26 @27
Menhaden, Light Strained ..... 32 @33
Menhaden, Bleached Winter ... 35 @ ...
Menhaden, Ex Bleached Winter 37 @ ...
Tallow, prime ..... 51 @52
Cocoanut, Ceylon ..... 6 @ 6¼
Cocoanut, Cochin ..... 6¼@ 6¾
Cod, Domestic ..... 34 @35
Cod, Newfoundland ..... 36 @34
Red Elaine ..... 30 @ ...
Red Saponified ..... ₱ lb 5 @ 5½
Olive, Italian, bbls ..... 57 @61
Neatsfoot, prime ..... 50 @52
Palm, prime, Lagos ..... ₱ lb 5¼@6

Mineral Oils.

Black, 20 gravity, 25@30 cold test ..... ₱ gal. 9¼@ 9¾
Black, 29 gravity, 15 cold test. 10¼@10½
Black, sun ner ..... 8¾@ 9¼
Cylinder, light filtered ..... 14½@17½
Cylinder, dark filtered ..... 11½@15½
Paraffine, 903-907 gravity ..... 14½@15½
Paraffine, 903 gravity ..... 13½@14½
Paraffine, 883 gravity ..... 12¼@13½
Paraffine, red, No. 1 ..... 14½@15½
In small lots ½¢ advance.

THE IRON AGE.

The oldest paper in the world devoted to the interests of the Hardware, Iron, Machinery and Metal Trades, and a standard authority on all matters relating to those branches of industry.

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CURRENT METAL PRICES.

JANUARY 2, 1901.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from Store—

Common Iron: Duty, Round, 0.6¢ ₱ ℔: Square, 0.8¢ ₱ ℔

1 to 1⅝ in. round and square	₱ ℔ 1.70@1.80¢
1⅝ to 4 in. x ⅜ to 1 in.	

Refined Iron:

1 to 1¾ in. round and square	₱ ℔ 1.75@1.85¢
1¾ to 4 in. x ⅜ to 1 in.	
1¾ to 4 in. x ¼ to 5-16	₱ ℔ 1.90@2.00¢

Rods—¾ and 11-16 round and square. ₱ ℔ 2.10@2.20¢

Angles:

	Cts ₱ ℔
1 in. x ¼ in. and larger	2.00¢
1 to 3½ in. x 3-16 in.	2.00¢
1¼ to 3 in. x ¼ in.	2.10¢
1¼ to 2¾ in. x 3-16 in. and thicker	2.00¢
1 to 1¾ in. x 3-16 in.	2.10¢
1 to 1¾ x ⅜ in.	2.20¢
¾ x ⅛ in.	2.50¢
¾ x ¼ in.	2.55¢
¾ x ⅜ in.	3.20¢
¾ x 3-32 in.	3.70¢

Tees:

1 in.	2.50¢
1¼ in.	2.40¢
1½ in. and larger	2.30¢
Beams	2.50¢
Channels, 3 in. and larger	2.25¢
Bands—1¼ to 6 x 3-16 to No. 8	₱ ℔ 2.15¢
"Burden's Best" Iron, base price	₱ ℔ 3.15¢
Burden's "H. B. & S. Iron, base price	₱ ℔ 2.95¢
"Juniata"	₱ ℔ 3.60¢
Norway Bars	4 @4½¢
Norway Shapes	4¼@4¾¢

Merchant Steel from Store—

	per ℔
Bessemer Machinery	1.80 to 1.90¢
Toe Calk, Tire and Sleigh Shoe	2.00@2.50¢
Best Cast Steel, base price in small lots	7½¢
Best Cast Steel Machinery, base price in small lots	6 ¢

Soft Steel Sheets—

¼ inch	2¢	No. 14	2.50¢
No. 16 inch	2.05¢	No. 16	2.60¢
No. 18	2.20¢	No. 18	2.90¢
No. 19	2.30¢	No. 20	3.30¢
No. 22	2.40¢	No. 22	3.40¢

Sheet Iron from Store.

Black.

	One Pass, C. R Soft Steel.	R. G. Cleaned
Nos. 14 to 16	₱ ℔, 3.05	3.10¢
Nos. 18 to 21	₱ ℔, 3.15	3.20¢
Nos. 22 to 24	₱ ℔, 3.25	3.30¢
Nos. 25 and 26	₱ ℔, 3.75	3.40¢
No. 27	₱ ℔, 3.45	3.50¢
No. 28	₱ ℔, 3.55	3.60¢

Russia, Planished, &c.

Genuine Russia, according to assortment ₱ ℔ 10½¢

Patent Planished ₱ ℔ A, 10½¢; B, 9½¢, net

Galvanized.

	B. B.
Nos. 10 to 16	₱ ℔, 12¢
Nos. 17 to 21	₱ ℔, 13¢
Nos. 22 to 24	₱ ℔, 14¢
Nos. 25 to 26	₱ ℔, 15¢
No. 27	₱ ℔, 16¢
No. 28	₱ ℔, 17¢
No. 29	₱ ℔, 19¢
No. 30	₱ ℔, 21¢

70@70&05% off

36 in. 1¢ ₱ ℔ higher.

Foreign Steel from Store—

Best Cast	₱ ℔ 15 ¢
Extra Cast	₱ ℔ 18 @ 20 ¢
Forged, Cast	₱ ℔ 16 ¢
Best Double Shear	₱ ℔ 15 ¢
Spring, 1st quality	₱ ℔ 13 ¢
German Steel, Best	₱ ℔ 10 ¢
2d quality	₱ ℔ 9 ¢
3d quality	₱ ℔ 8 ¢
Sheet Cast Steel, 1st quality	₱ ℔ 15 ¢
2d quality	₱ ℔ 14 ¢
3d quality	₱ ℔ 12 ¢
H. Huebel's "Special"	₱ ℔ 46 ¢
" " Annealed	₱ ℔ 75 ¢
" " "Titanic"	₱ ℔ 19 ¢
Robeson's Choice XX Extra Best	₱ ℔ 35 ¢
Jessop Self Hardening	₱ ℔ 45 ¢
Firmanes' "Nelson" Steel	40 ¢
Robeson's "Soho" Special Self-Hardening	₱ ℔ 43 ¢

METALS—

Tin—

Duty.—Pigs, Bars and Block. Free. Per ℔

Banca, Pigs	29¢
Straits, Pigs	28.5¢
Straits in Bars	29½¢

Tin Plates—

American Charcoal Plates.

Galland Grade:	
IC, 14 x 20	$6.75
IX, 14 x 20	8.25
Malvern Grade:	
IC, 14 x 20	6.95
IX, 14 x 20	7.75
Allaway Grade:	
IC, 14 x 20	5.50
IX, 14 x 20	6.60

American Coke Plates—Bessemer—

IC, 14 x 20 .....108 ℔	$4.85@4.90
IX, 14 x 20	$5.95@6.00
IXX, 14 x 20	$7.20@7.25

American Terne Plates—

IC, 20 x 28	$9.50@10.00
IX, 20 x 28	11.25@12.00

Tin Boiler Plates, American—

IXX, 14 x 20	112 sheets	$12.50
IXX, 14 x 28	112 sheets	13.50
IXX, 14 x 31	112 sheets	15.00

Copper—

Duty: Pig, Bar and Ingot and Old Copper free Manufactured, 2½¢ ₱ lb.

Ingot—

Lake	17¼@17¾¢
Ansonia grade Casting	17@17¼¢

Sheet and Bolt—

January 19, 1900. Net.

Prices, in cents per pound. Sheet 30 x 60.

Not wider than	Not longer than	And longer than	64 oz. & over, 50 lb. sheet, 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lb.	24 oz. to 32 oz. 18¾ to 25 lb.	16 oz. to 24 oz. 12½ to 18¾ lb.	14 oz. and 15 oz. 11 to 12½ lb.	12 oz. and 13 oz. 9½ to 11 lb.	10 oz. and 11 oz. 7¾ to 9½ lb.	8 oz. and 9 oz. 6¼ to 7¾ lb.	Lighter than 8 oz.
Ins.	Ins.	Ins.									
30	72	.....	20¼	20½	20½	20½	21½	23½	23½	26½	29½
30	96	.....	20½	20½	20½	20½	21½	23½	26½	29½	
30	.....	96	20½	20½	20½	20½	22½	26½			
36	72	.....	20½	20½	20½	20½	22½	24½	27½	30½	
36	96	72	20½	20½	20½	22½	22½	26½	29½		
36	120	96	20½	20½	20½	22½	23½				
36	.....	120	20½	20½	20½	22½	24½				
48	72	.....	20½	20½	21½	22½	24½	27½	30½		
48	96	72	20½	20½	21½	23½	25½	28½			
48	120	96	20½	20½	22½	24½	28½				
48	.....	120	20½	21½	23½	26½					
60	72	.....	20½	21½	22½	24½	26½	31½			
60	96	72	20½	20½	22½	24½	29½				
60	120	96	20½	21½	23½	26½					
60	.....	120	20½	22½	24½	28½					
72	96	.....	20½	21½	23½	28½					
72	144	96	20½	22½	25½	30½					
72	.....	144	21½	23½	28½						
108	120	.....	21½	23½	29½						
108	.....	120	23½	24½							
wider than 108	144	.....	24½	26½							
	.....	144	25½	28½							

Bolt Copper, ⅜ inch diameter and over, ₱ ℔ 20½¢

Circles, Segments and Pattern Sheets, 3¢ ₱ ℔ advance over price of Sheet Copper required to cut them from.

Cold or Hard Rolled Copper 14 oz. ₱ square foot and heavier, 1¢ ₱ ℔ over the foregoing prices.

Cold or Hard Rolled Copper, lighter than 14 oz. ₱ square foot, 2¢ ₱ ℔ over the foregoing prices.

All Polished Copper, 20 in. wide and under 1¢ ₱ ℔ advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 in. wide, 2¢ ₱ ℔ advance over the price for Cold Rolled Copper.

Planished Copper—

1¢ ₱ ℔ more than Polished Copper.

Copper Bottoms, Pits and Flats—

14 oz. to square foot and heavier, ₱ ℔	24½¢
12 oz. and up to 14 oz. to square foot, ₱ ℔	25½¢
10 oz. and up to 12 oz., ₱ ℔	27½¢
Lighter than 10 oz., ₱ ℔	30½¢

Circles less than 8 in. diameter, 2¢ ₱ ℔ additional.

Circles over 13 in. diameter are not classed as Copper Bottoms.

Copper Wire—

Hard and Soft Drawn—B. & S. Gauge.

List March 2, 1900.

Nos.	0000 to 8 Base	9 and 10		11 and 12
		½¢		¼¢ ₱ ℔ adv.
Nos.	13	14	15	16
	¾¢	¾¢	1¢	1¼¢ ₱ ℔ adv.
Nos.	17	18	19	20
	1½¢	2¢	2½¢	2¾¢ ₱ ℔ adv

Seamless Brass Tubes—

Standard always Stubs' gauge, unless otherwise ordered.

Feb. 6, 1899. Net. Outside Diameter.

Stubs' W.G.	B. & S. W.G.	¼	5-16	⅜	7-16	½	9-16	⅝	¾	⅞	1	1¼	1½
4-11	3- 9	...	.....	...	.....	33	31	30	29	28	27	25	24
12	10	...	.....	37	35	33	31	30	29	28	27	25	24
13	11	...	.....	37	35	33	31	30	29	28	27	25	24
14	12	...	41	37	35	33	31	30	29	28	27	25	24
15	13	...	42	38	36	33	32	31	30	30	28	26	25
16	14	...	43	39	37	34	33	32	31	30	29	26	25
17	15	...	44	40	38	35	34	33	32	31	30	27	26
18	16	61	46	42	39	36	35	34	33	32	31	28	27
19	17	62	47	43	40	37	36	35	34	33	32	30	29
20	18-19	64	49	44	41	39	38	37	36	35	34	32	31
21	20	66	51	46	43	41	40	39	38	37	36	35	34
22	21	71	55	48	44	42	41	40	39	38	37	37	36
23	22	76	61	50	46	44	43	42	41	40	39	39	39
24	23	81	66	53	48	46	45	44	43	41	40	40	41
25	24	86	71	56	51	49	47	46	45	43	43	44	45

Copper Bronze and Gilding Tube, 3¢ ₱ ℔ additional

Iron Pipe Sizes—Brass

⅛	¼	⅜	½	⅝	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6 inch
36	32	20	27	27	21	21	21	21	21	21	23	21	23	27	28	₱ ℔

Copper, Bronze or Gilding Tubes, 3¢ ₱ ℔ additional

Brazed Brass Tubing.

(*To No. 19, inclusive.*) Feb. 26 1896

Brown & Sharpe's gauge standard.

	Per ℔.
Plain Round Tube, ¾ in. up to 2 in.	$0.35
" " ⅝ " ¾ "	.38
" " ½ " ⅝ "	.41
" " 7-16 " ½ "	.48
" " 5-16 " 7-16 "	.65
" " ¼ " 5-16 "	1.00
" " 3-16 " ¼ "	1.50
Smaller than ¼ inch	Special
3 inch and larger	.40
Over 3 inch to 3½ inch, inclusive	.45
Over 3½ inch	.50

Bronze and Copper, advance on Brass List, 3 cents.

Discount from list 5 35%

Roll and Sheet Brass—

(*Brown & Sharpe Standard Gauge.*)

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.
Wider than	2	12	14	16	18	20	22	24
and including	12	14	16	18	20	22	24	26
To No. 20, inclusive	.22	.23	.25	.27	.29	.31	.33	.36
Nos. 21 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37
Nos. 25 and 26	.23	.24½	.27	.29	.31	.33	.35	.38
Nos. 27 and 28	.23	.25	.28	.30	.32	.34	.36	.39
Common High Brass	in.	in.	in	in.	in.	in.	in.	in.	in
Wider than	26	28	30	32	34	36	38	40	
and including	28	30	32	34	36	38	40		
To No. 20, inclusive	.39	.42	.46	.50	.55	.60	.65		*
Nos. 21, 22, 23 and 24	.40	.43	.47	.51	.56	.61	.68		
Nos. 25 and 26	.41	.44	.48	.52	.57	.63	.71		
Nos. 27 and 28	.42	.45	.49	.53	.58	.65	.75		

* Special prices not less than 80 cents.

Add ¼¢ ₱ ℔ additional for each number thinner than Nos. 28 to 38 inclusive. Discount from List 20%

Wire in Coils. List February 26, 1896.

Brown & Sharpe's gauge the standard.	Com. high brass.	Low brass.	Gild'g bronze and copper
All Nos. to No. 10, inclusive	$0.23	$0.27	$0.28
Above No. 10 to No. 16	.23½	.27½	.28½
No. 17 and No. 18	.24	.28	.32
No. 19 and No. 20	.25	.29	.33
No. 21	.26	.30	.34
No. 22	.27	.31	.35
No. 23	.28	.32	.36
No. 24	.30	.34	.38
No. 25	.32	.36	.40
No. 26	.35	.39	.43
No. 27	.38	.42	.46
No. 28	.42	.46	.51
No. 29	.45	.49	.54
No. 30	.48	.52	.62
No. 31	.51	.55	.67
No. 32	.55	.59	.73
No. 33	.59	.63	.82
No. 34	.64	.68	.95
No. 35	.70	.74	1.30
No. 36	.76	.80	1.50
No. 37	1.00	1.04	1.70
No. 38	1.30	1.34	2.00
No. 39	2.00	2.00	3.25
No. 40	2.60	2.60	5.75

Discount, Brass Wire, 20%; Copper Wire, Net. List November 16, 96.

Spring Wire. 2¢ ₱ ℔ advance.

Tobin Bronze—

Straight, but not turned, Rods, ⅝ to 3 in. diameter, ₱ ℔, net 20¢

Finished Piston Rods, ⅝ to 2½ in. diameter, ₱ ℔ net 21¢

Other sizes and extreme lengths, special prices.

Spelter—

Duty: In Blocks or Pigs, 1¢ ₱ ℔

Western Spelter 4.55@4.60¢

Zinc.

Duty: Sheet, 2¢ ₱ ℔.

600 ℔ casks ...7¢ | Per ℔ 7¾@7¼¢

Lead.

Duty: Pigs and Bars and Old, 2½¢ ₱ ℔. Pipe and Sheets, 2½¢ ₱ ℔.

American Pig	4½@4¾¢
Bar	5½@5¾¢
Pipe	4½¢
Tin Lined Pipe	12½¢ ..... 20% off
Block Tin Pipe	40 ¢ ..... 20% off
Sheet Lead	7¢ ..... 20% off

Old Lead in exchange, 3½¢ ₱ ℔.

Solder.

½ & ½, guaranteed 10½@10½¢

No. 1 .....15 @18 ¢

Prices of Solder indicated by private brand vary according to composition.

Antimony—

Duty, ½¢ ₱ lb.

Cookson	₱ ℔ 11
Hallett's	₱ ℔ 10
U. S.	₱ ℔ 9½@10¢

Aluminum—

Duty: Crude, 8¢ ₱ ℔. Plates, Sheets, Bars and Rods, 13¢ ₱ ℔.

No. 1 Aluminum (guaranteed over 99% pure), in ingots for remelting:

Small lots	₱ ℔ 37¢
100-℔ lots	₱ ℔ 35¢

No. 2 Aluminum (guaranteed to be over 90% pure), in ingots for remelting:

Small lots	₱ ℔ 34¢
100-℔ lots	₱ ℔ 33¢

Aluminum Sheet, B. & S. gauge. 50 ℔ or more.

Wider than	6-in.	14-in.	24-in.
And including	14-in.	24-in.	30-in.
	₱ ℔	₱ ℔	₱ ℔
Nos. 13 to 19	$0.42	$0.44	$0.47
No. 20	.44	.46	.49
Nos. 21 to 23	.46	.48	.51
No. 24	.48	.50	.53
No. 25	.47	.51	.54
No. 26	.47	.54	.59
No. 27	.48	.57	.62
No. 28	.48	.57	.64
No. 29	.49	.60	.69
No. 30	.50	.64	.77

Note.—Lots of less than 50 ℔ 5¢ ₱ ℔ extra.

Aluminum Wire, B. & S. Gauge.

Larger than No. 9	₱ ℔ 40¢	No. 15	₱ ℔ 43¢
No. 9 to No. 10	₱ ℔ 40½¢	No. 17	₱ ℔ 50¢
No. 11	₱ ℔ 41 ¢	No. 18	₱ ℔ 55¢
No. 12	₱ ℔ 41½¢	No. 19	₱ ℔ 60¢
No. 13	₱ ℔ 42 ¢	No. 20	₱ ℔ 65¢
No. 14	₱ ℔ 43½¢	No. 21	₱ ℔ 85¢

Old Metals.

Dealers' Purchasing Prices Paid in New York.

Heavy Copper	₱ ℔ 14½¢
Light and Tinned Copper	₱ ℔ 13½¢
Heavy Brass	₱ ℔ 9 ¢
Light Brass	₱ ℔ 7½¢
Lead	₱ ℔ 4½¢
Tea Lead	₱ ℔ 3½¢
Zinc	₱ ℔ 3 ¢
No. 1 Pewter	₱ ℔ 17 ¢
No. 2 Pewter	₱ ℔ 9½¢
Tin Plate Scrap	₱ ton $6.50
Wrought Scrap Iron	₱ gross ton $10 00@10.25
Heavy Cast Scrap	₱ gross ton $10 50@11.00
Stove Plate Scrap	₱ gross ton $7.00@ 7.50
Burnt Iron	₱ gross ton $5.00@ 5.50